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# Telegraph and Telephone Age

No. 1 NEW YORK, JANUARY 1, 1919. Thirty-seventh Year

## Telegraph and Telephone Age

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NEW YORK, JANUARY 1, 1919.

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### A Happy New Year.

To telegraph and telephone officials and workers everywhere, TELEGRAPH AND TELEPHONE AGE wishes a happy and prosperous new year. We are passing through trying times, but the men of the wires have passed through many seasons of stress in days gone by and have ever emerged therefrom a pole or two further along the road of progress.

*A Happy New Year.*

### Stronger Railroad Pole Lines Recommended by Railway Telegraph Superintendents.

One of the most important matters acted upon by the Association of Railway Telegraph Superintendents at its annual meeting in Chicago, December 5, was the adoption of rules for specifications for railroad pole lines, which provide that such lines shall be designed under proper assumptions of load of wind and ice for the territory in which located, with a factor of safety of 2, except for poles located within striking distance of main track, in which case the factor of safety shall be 3.

Up to the present time telegraph and telephone pole lines have been built in accordance with the individual experience or more or less "rules of thumb method" which has not given the results now required.

The method of design now recommended by this association will apply recognized engineering principles, which are generally followed in other structural work, and while the initial expense may be somewhat increased, a saving will be effected by less maintenance cost and the avoidance of delay and interference with railroad traffic by failure of telegraph and telephone service used to operate the railroads.

The committee having the matter in hand believe that the factor of safety of 2 will be sufficient for poles generally, so as to insure continuity of service and that the factor of safety of 3 should be used for poles located within striking distance of tracks, a failure of which would interfere with the running of trains by obstructing the tracks as well as severing communication.

### The Morkrum Factory in Chicago.

A visit to the spacious and modernly equipped factory of the Morkrum Company in Chicago is a revelation to a telegraph man.

Most of us are familiar with pictures of the factories of the great watch companies, typewriter companies and cash register companies, and it certainly is a credit to the telegraph business, as well as evidence of the enterprise of the Morkrum Company, when we realize that the factory now turning out Morkrum printing telegraph machines compares favorably with other great industrial establishments employing scores of expert mechanics.

An inspection of the Morkrum plant will convince any telegraph man that the Morkrum printer is here to stay.

### Lord Northcliffe Praises Signal Corps.

"When the history of the war comes to be written, the story of the Signal Corps of the United States Army, under Brigadier-General Edgar Russel and Colonel John J. Carty, will read like a page of romance."—*Lord Northcliffe.*

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# CURRENT EVENTS

## Executive Office Announcements, Personal Mention, Appointments

### PERSONAL.

ALBERT B. CHANDLER, until a few years ago president of the Postal Telegraph-Cable Company, New York, has returned from his summer home in Vermont, to his Brooklyn, N. Y., residence for the winter.

GEORGE H. SICKLES, of the Associated Press telegraph department, Philadelphia, Pa., was a recent New York visitor. Mr. Sickles is one of the three oldest telegraphers in point of service with the Associated Press, he having entered the employ of the original New York Associated Press at 145 Broadway as a messenger in the year 1871.

Saim Salim, a Turkish student now in this country, is studying the operation of telegraph and telephone systems here with a view to aiding in the introduction of modern methods in Turkey as soon as peace conditions set in.

Robert I. Flowers, expert Morse telegrapher, is now a member of Company 22, Camp Bowie, Texas.

HAROLD CARLSON, chief electrician radio, U. S. N., is now located at the Sea Gate, N. Y., radio station. Mr. Carlson at one time was employed as operator on the Great Northern Railroad in Minnesota, his home state.

### POSTAL TELEGRAPH-CABLE CO.

#### EXECUTIVE OFFICES.

DAVID H. GAGE, JR., who for some time has been in the service of the war department at Washington, has rejoined the engineering staff at 253 Broadway, New York.

MANAGERS APPOINTED: H. R. Hupman, Clinton, Ia.; Emma C. Holland, Beloit, Wis.; O. T. Turner, Berrien Springs, Mich.; J. F. Barter, Jacksonville, Ill.; Mrs. E. M. Lyle, Natchez, Miss.; Miss L. A. Dobrowolski, Hot Springs, Ark.; J. N. Fish, Mojave, Cal.; E. V. Nye, Ellensburg, Wash.; W. W. Schreiber, Champaign, Ill.; Frederick E. Deir, Yakima, Wash.; E. G. Woolsey, Hudson, N. Y.; Howard Waterstreet, Herkimer, N. Y., and Mitchell E. Pickens, Socorro, N. M.

HARRY L. VINCENT, wire chief and district electrician at Boston, Mass., for the Postal Telegraph-Cable Company, died in that city December 11. Mr. Vincent was one of the most competent telegraph and telephone electricians in the service of the Postal Company.

#### NEW OFFICE AT BRIDGEPORT.

At Bridgeport, Conn., the company's office has been moved to a new location with largely increased floor space, and where the facilities are in keeping with the advancement of the company's business in Bridgeport. The new office is handsomely equipped, the work having been done by Foreman A. C. Teller of New York, under direction of J. P. O'Donohue, division engineer. Thomas P. Dowd is manager, and Harry Hawkins chief operator.

SAMUEL COHEN, manager of the Postal Telegraph-Cable Company's important branch office at 225 Pearl Street, New York, has been in the service of the Postal Company since 1890. In that year he started as messenger in the Metal Exchange branch office, 234 Pearl Street, subsequently advancing through the various grades of assistant clerk, clerk, operator and manager at 51 William Street, 99 Nassau Street, 274 Columbus Avenue and 1947 Broadway. Mr. Cohen has been manager of the 225 Pearl Street office since March, 1911, and is regarded as one of the most successful and aggressive business getters in the service.

Corporal Louis Sterrace, of the Thirty-third Field Artillery and formerly chief operator of the office at 944 Broadway, has returned from army service and has reentered the employ of the company.

William J. Regan, formerly connected with the line department in New York was a member of the 26th Infantry, 27th Division, and saw service in France. The New York Times of December 11 quotes Mr. Regan as saying upon his return to this country: "My division was known as O'Ryan's Roughnecks. The Huns got my left foot at Mount Kemmel on July 31, and it was necessary to amputate it."

#### DEATH OF H. E. BARFIELD.

H. E. Barfield, Morse telegrapher, employed in the San Francisco main office of the Postal Telegraph-Cable Company, died recently in that city.

At the San Francisco telegraphers' tournament held August 27, 28, 1915, Mr. Barfield won first prize in the commercial message class, receiving sixty messages in twenty-eight minutes forty-nine seconds, also second prize in the thirty-minute sending contest.

WARREN H. MICHENER, who for more than thirty years has been manager of the Fulton Market, New York, office of this company, died December 4, after an illness of about a year.



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## WESTERN UNION TELEGRAPH CO.

EXECUTIVE OFFICES.

THOMAS W. CARROLL, general manager, S. B. Haig, division traffic superintendent, and Chester McKay, division auditor, have returned to their offices after a trip to St. Johns, N. B., on company business.

LOUIS F. WRIGHT has returned to the engineering department, New York, from which he resigned to join the aviation service of the government. He entered the United States Military School of Aeronautics at Cornell University, Ithaca, N. Y., for preliminary training, after which he was transferred to Camp Dick, Dallas, and later on to Scott Field, Belleville, Ill. He received his discharge on November 29, 1918, after some training in actual flying.

W. L. GLASHEEN, chief operator of the San Francisco office, has been appointed division wire chief, succeeding A. W. Douglas, who has re-entered the railroad telegraph service as assistant superintendent of telegraph, Rock Island Lines, Chicago.

J. E. MIFKA has been appointed chief operator of the main office, San Francisco.

MILTON REX, gunner's mate, and son of J. B. Rex, chief operator at Boston, spent the holidays at home. While serving in the United States Navy during the war, Mr. Rex made many trips across the Atlantic and witnessed many warlike events.

SERGEANT ELIAS A. KIMBALL, a telegrapher, formerly in the service of the Western Union Telegraph Company, and during the fighting in France a member of the American forces, has been decorated with the French war cross and a palm, the insignia having been presented to Sergeant Kimball personally by Premier Clemenceau of France. At Belleau Wood he won the war cross for saving the life of his wounded major. Later, at Soissons, he won the Palm by sticking to his radio outfit under a heavy fire. In another engagement, he was gassed and was unconscious for seventy-two hours.

## New York Western Union.

Ensign Edward M. Duncan, who prior to entering the naval service was cable agent for this company covering the district in New York City north of Forty-second Street, has returned from European waters on a short furlough. Ensign Duncan has been serving with the northern bombing group in the English channel.

Dr. Chas. C. Weyant, who was prominent in New York telegraph circles in the late seventies and eighties, died on December 13. While a member of the night force he studied dentistry and graduated with high honors. Since leaving the telegraph service he had built up a lucrative business in his chosen profession. He always, however, retained a warm place in his heart for his former associates, and mingled with old comrades whenever the opportunity offered.

E. Uchida of the department of communications, Tokio, Japan, also T. R. McGetrick, chief operator, Trenton, N. J., were recent visitors at this office.

Miss L. M. Park, formerly chief operator, New York main office, has returned to the service of this company in the capacity of supervisor of employment work at division headquarters.

## Washington, D. C., Western Union.

THE SUPERVISORY STAFF of this office consists of C. H. Dexter, chief operator; Miss M. J. Larmon, assistant chief operator in charge of telephone department; A. L. Townsend, assistant chief operator in charge of automatics; W. L. Ferris, chief clerk to the chief operator; T. H. Haley, force chief and efficiency supervisor, automatic department; H. C. Townsend, assistant wire chief in charge of the Morse testing and regulating department; C. McCullen, wire chief; F. H. Pfaff, general traffic chief, and H. W. Dowling, assistant chief operator in charge of Morse force.

C. H. Dexter, recently appointed chief operator of traffic in this office, in six years and three months advanced from the position of junior Morse operator to that of traffic chief of the Washington office. In 1913 he was assigned to a branch office as manager and a year later was transferred to the main office to work one of the heavy trunk circuits. From this time on his promotion was rapid, he having served as traffic supervisor, supervisor service bureau, assistant chief operator and as acting chief operator.

T. M. Haston of the Washington office has been appointed division traffic supervisor, with headquarters at the same place, vice W. E. Stimpson, furloughed on account of ill health.

## Yuletide Innovation by Telegraph.

The Western Union Telegraph Company this year introduced a unique and pleasant holiday innovation.

The company arranged a system for the delivery of cash gifts in any part of the country on Christmas morning. The giver makes his deposit at any office of the company, designates the recipient and on Christmas morning a draft, together with a specially prepared Christmas card issued by the company, is delivered to the recipient. If the sender desires, an additional message may accompany the draft at the regular telegraph rates.

F. B. CHASE, thirty-two years of age, and for ten years employed as operator, repeater attendant and branch office manager for the Western Union Telegraph Company, Cincinnati, Ohio, died in that city recently. At the time of his death Mr. Chase was president of the Pathe Film Exchange, having entered the service of that company about four years ago. Beginning in a subordinate capacity, Mr. Chase rapidly worked his way to the top of the film organization, and his death is a serious loss to the company as well as to his family and his many friends in the telegraph business.

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## THE TELEPHONE.

MAJOR HAMLET C. RIDGEWAY, a former Chicago telephone man, has returned from the battlefront. Before he left France on November 2, Major Ridgeway was notified that he would be promoted to lieutenant-colonel. Major Ridgeway received a medal for bravery after a bloody encounter with the Huns at Bois de Chames, north of Verdun. In this engagement his battalion of the 131st Infantry held the enemy for twenty-four hours until reinforcements arrived, and prevented a serious break in the allied line. During the engagement the battalion was reduced from 1,400 to 172 unwounded men. Only two unwounded officers remained when the battalion finally was able to withdraw after help came.

### Telephone Soldiers Promoted.

Captain Richard E. Walsh, formerly of Company E, 410th Telegraph Battalion, has been promoted to major, and placed in command of the 402d Telegraph Battalion.

First Lieutenant Clarence D. Hoover has been promoted to captain, and assigned to the command of Company E, 410th Telegraph Battalion.

Major Walsh was a private branch exchange foreman, Chicago maintenance department, before entering military service. He has been with the Chicago Telephone Company for twenty years as testman, repairman, installer and foreman.

Major Walsh served as a private in the Spanish-American war. He was a member of Company G, 7th Illinois Infantry. When war was declared against Germany he had been a lieutenant in Company H, 7th Illinois Infantry, for five years.

Lieutenant Hoover was at the first civilian training camp at Fort Sheridan, Ill. When war was declared he was an equipment engineer for the Chicago Telephone Company. He was made a first lieutenant in Company E, 410th Telegraph Battalion, when the Signal Corps was organized in June, 1917.

### American Telephone Operators in France.

American women telephone operators, says the *National News*, on the other side of the Atlantic, played a gallant part when the United States Army started the attack on St. Mihiel.

There were six operators chosen for work at headquarters, and during the six days following the launching of the offensive on September 12, they stuck to their work, handling an average of 40,000 words a day over the eight lines they operated, and working any hours that were asked of them, day or night.

When they finally did move out of there, it was only to move with the First Army's headquarters to another part of the line, where they arrived in time to do similar yeoman service when the September 26 drive opened on the front northwest of Verdun.

The six girls, while at the front, roughed it with the rest of the army, and were subject to all the discomforts and dangers that came with being billeted in the forward area over which the Boche aviators flew when they could.

## CANADIAN NOTES.

CHARLES MURPHY, recently appointed general manager of western lines, Canadian Pacific Railway, with headquarters at Winnipeg, Man., began his career as operator for the Canadian Pacific Railway about thirty-five years ago. In 1890 he was chief dispatcher at Chapleau, Ont., later being advanced to superintendent, and to general superintendent.

IN THE SERVICE of the Canadian Pacific Railway Company's Telegraph, the following staff changes have taken place: A. Malcolm, chief operator at Montreal, has been appointed inspector with headquarters at Montreal. C. W. McDonald, agent at London, Ont., has been advanced to chief operator of the Montreal office. C. N. Souch, traffic chief, Toronto, has been appointed agent for the company at London.

J. MITCHELL, inspector of the eastern division, Canadian Pacific Railway Company's Telegraph, Montreal, has been appointed superintendent of traffic, eastern lines, with headquarters at the same place.

HON. GIDEON D. ROBERTSON, who was appointed minister of labor in the Canadian government November 7, was born at Welland, Ont., August 26, 1874. From April, 1908, to February, 1914, Mr. Robertson was general chairman of the Order of Railroad Telegraphers on the Canadian Pacific Railway, and February, 1914, to January 1, 1918, Canadian vice-president, Order of Railroad Telegraphers. He was appointed a senator January 31, 1917, and a government minister without portfolio October 23, 1917.

WALTER GRAHAM, wire chief for the Canadian Pacific Railway Company's Telegraph at Fort William, Ont., and B. A. McNab, editor Montreal Star, are said to have been the first telegraphers in Canada to use the typewriter in copying press reports. In the year 1891 Mr. Graham worked in the Montreal office of the Associated Press and Mr. McNab was operator in the Star office.

THOMAS AHEARN, president of the Ottawa Electric Company, Ottawa, Canada, was a recent New York visitor.

### The Right Time to Start.

Every man and woman in the telegraph or telephone services should look forward to old age and to periods of sickness. All of us in the course of time face these conditions.

The Serial Building Loan and Savings Institution conducts a telegraphers' savings bank, and has done business successfully and without loss during the past thirty-three years.

Offices are maintained at 195 Broadway, 253 Broadway, and 24 Walker Street, New York.

E. F. Howell, 195 Broadway, New York, is the secretary of the institution and he will be pleased to furnish information on the subject of saving.

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# The Progress of Government Control of Telegraphs and Telephones.

As announced in our December 1 issue, the Postmaster General appointed a board for the operation of the telegraph and telephone services under government control, consisting of Union N. Bethell, vice-president of the American Telephone and Telegraph Company as chairman; F. A. Stevenson, general superintendent of plant, American Telephone and Telegraph Company, and A. F. Adams, presinent of the Kansas City Home Telephone Company.

The right of the government to purchase the telegraph systems is given under an existing law, according to administration officials. This law, passed in 1866, was designed to give government aid in the construction of telegraph lines and provided that the privileges of operation given the companies were non-transferable, except that the government might purchase the property.

Provision was made for the appointment of five disinterested persons to appraise the properties, should the government decide to purchase them. Two of the appraisers would be named by the Postmaster General, two by the companies and the fifth by these four men.

The editorial comments of the large and influential daily newspapers have been uniformly antagonistic to the plans of the Postmaster General for the seizure of the telegraph, telephone and cable systems heretofore owned and operated by private companies.

Prompted possibly by this adverse criticism, the Postmaster General on December 16 addressed a communication to Representative Moon, chairman of the House Postoffice Committee, and nominal author of the resolution to provide government ownership of the wire systems. One paragraph of the Postmaster General's letter reads:

"The information acquired through Federal control of the telegraph and telephone systems since August 1 last, enables me to assure you that the entire wire system can be acquired without requiring the appropriation of a dollar from the public treasury and that through the savings by the elimination of the duplications in plants and operating expenses, the entire telegraph and telephone systems of the country can be paid for through an amortization fund in twenty-five years without increasing the rates to the public and at the same time develop a national wire system available for the use of every community in the country coextensive with the present postal system."

The economic importance of acquiring the wire properties according to Mr. Burleson is great. "Private capital is invested in public service enterprises with the expectation of 7 or 8 per cent and often a greater return upon the investment," he wrote. "This, of course, the public is expected to pay while the government can borrow money at 4½ per cent. The public, however, pays the charge in either event. The difference between 4½ and 8 per cent for the money invested in the wire systems of the country would maintain and pay for the property in eighteen years and nine months."

Mr. Burleson asserted that the same principle which justifies government ownership of the postal system applies equally to wire systems.

"To establish and maintain means of communication," he added, "is as much the function of the government as is the provision for national defense. An established and widely extended means of communication is in fact a part of the national defense. Moreover, it is essential to the development of the country and the progress and prosperity of its people. It is a defense of the national interest as much in peace as in war."

Private ownership of the wire systems has restricted operation to areas profitable to the owners, Mr. Burleson contends. The competition is that of pursuit of profits and not rivalry for public benefit or gain. On the basis of an extended survey of the situation, said by Mr. Burleson to have been made, he wrote: "It clearly appears that unification of control and operation are necessary to eliminate the wastes and inherent defects of the competing and duplicating system which has heretofore existed. It would be as logical to have two or more postoffices in the same town operating independently."

### NEWCOMB CARLTON HEADS CABLES.

After George Gray Ward, vice-president and general manager of the Commercial Cable Company, declined to assume direction of the combined cable systems, the Postmaster General appointed Newcomb Carlton, president of the Western Union Telegraph Company, to take charge of the operation of the cables. Immediately thereafter the Commercial Cable Company, through its counsel, Charles E. Hughes and William W. Cook, filed amended papers in the United States District Court in New York making Mr. Carlton a co-defendant with Postmaster General Burleson in the suit of the Commercial Cable Company to have set aside Mr. Burleson's seizure of the submarine cables.

This action was taken following a futile effort on the part of the United States Marshal to serve a subpœna on Mr. Burleson in this city for the purpose of bringing the suit within the jurisdiction of the district court in New York. Mr. Carlton was served with a subpœna at 4 o'clock, December 17.

On December 19, after an all-day session with the Postmaster General, Mr. Carlton stated that the intention was to restore the cable systems to private control at the termination of government direction.

"This scheme," said Mr. Carlton, "does not include government ownership. Mr. Burleson has at no time indicated to me that government ownership of cables formed any part of his plans. The idea is to hand the cables back to the owners with a sort of a benediction."

Mr. Carlton explained that he meant that the government's attitude, after restoring the cables,



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would be "paternalistic," with a view to assisting the companies in carrying out Mr. Burleson's plan for extension of the cable systems.

"It is possible," said Mr. Carlton, "that the government's assistance may take the form of loans for extension of the systems."

DETAILS OF CHANGES WITHHELD.

Mr. Carlton added that so far as the present operations of the Western Union and the Commercial Cable Companies are concerned, neither needs financial aid. He declared, however, that if the systems were materially extended, such assistance would be needed.

Although Mr. Carlton said that he and Mr. Burleson had discussed the cable situation for practically an entire day, he declined to make known what changes the government intends to make in the service during the "emergency period."

He declared that the lifting of the ban on commercial codes would greatly expedite business on the cables, but said such a step was solely in the hands of the government censors and that he did not know when such action would be taken.

Mr. Carlton declined to discuss the Postmaster General's probable action in regard to the suit of the Commercial Cable Company against him and Mr. Burleson to restrain them from further control of the cables, or to state whether he will appear at the hearing in the Federal Court.

PRESIDENT MACKAY PROTESTS.

Clarence H. Mackay, president of the Postal Telegraph-Cable Company and of the Commercial Cable Company, commenting upon Mr. Carlton's statement, declared that if Mr. Burleson thinks he can keep the land lines after peace has been declared, he is mistaken. Referring to Mr. Carlton's statement that Mr. Burleson will return the cables with a benediction, Mr. Mackay declared that the first benediction should be to "undo the unspeakable outrage of turning our lines over to our competitor, the Western Union."

Another benediction, Mr. Mackay said, should be the revoking of Mr. Burleson's orders removing Edward Reynolds, general manager of the land lines of the Commercial Cable Company; George G. Ward, the general manager of the ocean lines; W. W. Cook, the general counsel, and himself from any connection with the operation of the system.

Mr. Mackay also declared that he believes Mr. Carlton should have resigned his position in the Western Union before he assumed a position with the government under Mr. Burleson. He added that he also believes Theodore N. Vail should have resigned his position as president of the American Telephone and Telegraph Company before becoming Mr. Burleson's adviser.

GOVERNMENT ACTS TO END CABLE SUIT.

Acting on instructions from Attorney General Gregory, Assistant United States District Attorney Harold Harper on December 21 filed in the Federal court motion papers, asking for the dismissal of the injunction suits instituted by the Commercial Cable Company and the Commercial Pacific Cable Company against Postmaster General Burleson and Newcomb Carlton, federal cable director.

The main contention set forth by Mr. Harper is that the Commercial properties have not been seized by the Postmaster General and Mr. Carlton as individuals, but by President Wilson "in the exercise of his executive duties and discretion, and pursuant to a resolution passed by Congress." It is further argued that the Federal District Court is without jurisdiction to entertain these suits, since neither the President nor the United States Government can be made a party.

The other grounds upon which dismissal of the actions is asked are that the complaints do not allege facts to constitute a valid cause of action in equity, that the war existing on July 16, 1918, still continues and the court, having judicial notice of that fact, should strike out from the complaints the allegations that war ceased on November 11. The paper of Mr. Harper also says in this connection that the allegations "are manifestly unfounded and impertinent; that the proclamation under which the cables were taken possession of, signed by the President on November 2, 1918, and attested by the Secretary of State, is conclusive that it was done on that day and negatives the allegations that it was not signed until November 11, 1918." Mr. Harper also argues that the taking over of the cables by the President is conclusive, that in his judgment possession of them is deemed necessary for the national security and defense, and that the congressional resolution provided "just compensation for the use of the lines," thereby nullifying the company's claim of financial injustice.

## New Telephone Rates Announced.

On December 18 the Postmaster General announced new telephone toll rates to become effective January 31, 1919.

Toll service under the new standardized rates are to be of two classifications: station-to-station messages and person-to-person calls; the latter service costing more.

The station-to-station service will cost the caller at the rate of five cents for every six miles up to twenty-four miles, which would cost twenty cents for a conversation continuing for five minutes. From twenty-four to thirty-two miles the toll charge will be twenty-five cents, and from thirty-two miles to forty miles, forty cents. Toll calls between forty and forty-eight miles will cost thirty-five cents, and between forty-eight and fifty-six miles a charge of forty cents will be made. For each additional six miles or fraction thereof an additional five cents charge will be made.

On all person-to-person calls in addition to the rate being based on distances as in the station-to-station plan, a service charge will be made in the following cases:

When the order is to establish communication with a particular person in a given city, telephone address unknown and the particular person cannot be located within one hour.

When the designated person called refuses to talk.

When the report is returned that the designated

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person called is "out," or "out and will return at (specified time)" or "out and time of return unknown," "is absent from the city" and similar reports advising the calling subscriber of the facts ascertained when failure to complete the order is due solely to the circumstances of the called person or to fault in describing the location of the called person, and when all of the work preliminary to establishing communication with the called person is done.

When communication between the designated persons cannot be established because the designated person at the calling station is absent at the calling station; provided that no charge shall be made in such cases where the delay, if any, in establishing connection is greater than one hour.

The initial period rates for person-to-person calls shall be approximately twenty-five per cent, in addition to the station-to-station rates between the same points, but no person-to-person rate shall be less than twenty cents.

In cases where person-to-person calls are not completed and a report is made, a report charge shall be made of approximately one-fourth the initial rate for station-to-station messages between the same points, but no report charge shall be less than ten cents for any one call, nor more than $2.

The rate for appointment call shall be approximately fifty per cent in addition to the rates for station-to-station messages, but in the case of any appointment call order, where the distant station is reached, whether the appointment be made or not, the report charge applicable in case of person-to-person calls between the same points shall be made. No appointment calls shall be accepted where the station-to-station rate is less than twenty-five cents.

The rates for messenger call shall be the same as applied to appointment calls between the same points plus any charges that may be required for the service of messengers. No messenger call shall be accepted where the station-to-station rate is less than twenty-five cents.

Between the hours of 8:30 p. m. and 12 midnight, the station-to-station charge shall be approximately fifty per cent less than the regular day rate. Between midnight and 4:30 a. m. the rate is further reduced to seventy-five per cent of the day rate, but in no night call will the minimum rate be less than twenty-five cents.

Referring to the service which is now designated as "free toll service," Postmaster General Burleson says there will be no change until a study of the rates is made.

## New Invention for Combined Telegraphy and Telephony.

On December 12, Postmaster General Burleson made public a letter from Theodore N. Vail, president of the American Telephone and Telegraph Company, announcing the invention and development by the technical staff of the Bell system of "a practical system of multiplex telephony and telegraphy by the use of which it is now possible to increase manyfold the message carrying capacity of long distance telephone and telegraph wires."

Bancroft Gherardi, acting chief engineer of the American Telephone and Telegraph Company, in giving out some preliminary information about the technical developments referred to by Mr. Vail, says in regard to the system:

"Physically it can be employed on any open wire telephone line, but practically it is not advantageous to use it on any short line, say less than 100 miles in length. The highly technical equipment required is so costly that it is economically available only for long lines.

"We have one installation in service, that on the Baltimore-Pittsburgh line, used in the recent demonstrations.

"The active intensive development of the system began several years ago and the technical work in connection with it was completed last spring. We had enough wires from Washington to Baltimore, but not enough from Baltimore to Pittsburgh. The multiplex system, therefore, was installed at Baltimore and for more than a month it has been carrying messages, which come to Baltimore from Washington over the ordinary circuits and there are given to the multiplex for transmission to their destination.

"It will be some time before the larger benefits of the system can be made available to the telephone using public, because a great amount of new apparatus must be installed and considerable work must be done on the lines themselves to adapt them to the new system. Our plans call for installing the system at several points where additional long distance facilities are required.

"The new system sends five voice currents simultaneously over one telephone circuit, taking each current as it is delivered into an ordinary telephone and delivering it at its destination, another ordinary telephone, exactly as it was formed at the sending point. These five voice currents travel together and are sorted for delivery at their destination. Not a tone or inflection of the speaking voice is changed in passage. This result is achieved by combining each voice wave with a carrier current which has characteristics in degrees of frequency that are entirely different from those of other carrier currents. The carrier current thus gives the voice wave an identity of its own and at the end of the journey the waves are sorted and directed into their proper channels, to be delivered as formed originally.

"The advantages of the system, when applied to telegraphy as well as to telephony, were clearly shown in our tests. We found that we can combine our system with the printing telegraph so as to secure the full advantages of the latter and the full advantages of the multiplex system in reducing wire requirements. Using our multiplex system with the ordinary hand-operated telegraph instrument, connected with a telephone circuit, we can send from 1,500 to 1,600 words in a minute. When the multiplex system is connected with the printing telegraph, we can send from 4,000 to 5,000 words in sixty seconds."

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# EDUCATIONAL.

**In the preparation of the following articles on telephony and radio telegraphy, authoritative works have been drawn on for the substance. The questions at the end of each department are made up independently of the works consulted and are prepared to enable the student to review the lessons. Books from which material is taken are "Radio Telegraphy," a publication by the United States Signal Corps, and "Modern American Telephony." The articles on telegraphy are prepared by the editorial staff.**

## Telegraphy.

In the December 16 instalment of this series of educational articles we explained some of the principles upon which electromagnets are made, and in what follows this subject is continued.

### MAGNETIC LEAKAGE.

In assembled electromagnets the leakage of lines between poles is seven per cent when the armature of the instrument is in contact with the pole faces, and when the armature is situated .004 inch away from the pole faces the magnetic leakage is fifty-three per cent. It is to be remembered, of course, that the greater the stream of magnetic lines between the poles, the more intense is the attractive force of the electromagnets.

In general, with cores of an inch or two in length, the turns of the winding on the outside are not as effective as the turns nearer the cores.

### TIME CONSTANT.

Varying currents in the windings of electromagnets are governed by a ratio of self-induction and the ohmic resistance, called "time constant." It represents the time required for a given current to reach .634 of its final strength.

The time constant $= \frac{L}{R}$, where L represents the inductance in henries and R the resistance in ohms.

Self-induction is proportional to the square of the number of wire turns on the magnet.

In electromagnets placing the windings in parallel reduces the time constant to one-quarter of that obtaining when the windings are connected in series.

The time constant factor of a circuit can be reduced by reducing the inductance or by increasing the ohmic resistance of the circuit.

With an electromagnet having an iron core the inductance depends upon the strength of the current flowing through the windings, since the permeability of the iron varies with the different values of magnetizing force. The inductance decreases with reduction of permeability as the magnetizing force increases.

Electromagnets of different sizes must be wound with ampere turns proportional to their linear dimensions if they are to be magnetized up to an equal degree of saturation.

Similar iron cores similarly wound with lengths of wire proportional to the squares of the linear dimensions will, when acted upon by equal current strengths, produce equal intensities of magnetic field at points similarly situated with respect to the cores.

*(To be continued.)*

## Telegraph Examination Questions.

There is no better way for a student to know what progress he is making in his studies than for him to try his hand at writing down the answers to questions asked in regular examinations.

The following list of questions was submitted recently in an elementary examination taken by applicants seeking promotion to positions as telegraph inspectors:

31. What is meant by hysteresis?

32. What is the time-constant of a circuit having an inductance of eight henries, and a resistance of eighty-two ohms?

33. (a) What is the time-constant of a circuit having an inductance of three henries, to which an E.M.F., of forty volts is applied and in which a current of 125 milliamperes is flowing?

(b) What would be the final current strength if the applied E.M.F. were changed to fifty-five volts, and with fifty-five volts applied what would be the current strength when the time-constant is equated?

34. What is the effective value of the counter E.M.F. in a circuit having a frequency of sixty cycles per second, a current strength of two amperes and an inductance of 2.5 henries?

35. How many turns of wire on a magnet having a winding space 1½ inches long 2 inches in diameter, and having a core 1 inch in diameter, assuming that the wire used has a diameter of .002 inch?

36. Draw a sketch showing a coil of wire on a core with current flowing in an indicated direction. Show which is the south pole of the magnet.

37. How many cells of gravity battery required to supply .038 ampere in a circuit having a line resistance of 820 ohms and an instrument resistance of 300 ohms?

38. (a) If a battery of 200 volts gravity feeds four lines simultaneously, one wire having a resistance of 1,800 ohms, another 1,600 ohms, another 1,200 ohms, and the fourth 1,400 ohms, what is the current strength in the 1,800-ohm wire with that circuit closed and the other 3 open?

(b) What is the current strength in the 1,200-ohm wire when all circuits are closed?

39. What would be the current value in the 1,800-ohm wire above referred to if a dynamo were used in place of gravity battery, the dynamo having an E.M.F. of 200 volts?

*(To be continued.)*

## Telephony.

### REPEATING COILS.

Telephone repeating coils must be adapted to two kinds of service, one for talking through only,



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and the other a combination of talk through and ring through.

Ringing current from a hand or power generator, has a rate of change of about 1,000 times per minute. This current also is of considerable magnitude and in order that it may be repeated into adjoining circuits without excessive loss of energy the coil has to be made up with a large amount of iron in the closed magnetic circuit, and have a very large number of turns of wire. In fact a coil having the highest efficiency for ringing purposes only would take on the form and dimensions of an electric lighting or power transformer.

The most efficient repeating coil for talking purposes only would have an entirely different form of construction, not unlike the standard telephone transmitter induction coil. Voice currents are of small magnitude and have a high rate of current change, an average of about 50,000 times per minute, which is fifty times that of the ringing current. This high rate of change requires a small amount of iron in the core of the repeating coil and a small winding in order to prevent waste of energy in the core and to give a responsiveness with a low retardation effect, so that the voice currents will retain their original character.

One type of talk-through repeating coil is designed for the transmission of voice currents without regard to bell signaling. It has not in its make-up sufficient iron or wire winding for magneto signaling to operate annunciator drops or bells, but is especially adapted to toll work where talking efficiency is important. It is seldom used on switchboards on account of its inability to repeat ringing currents.

A repeating coil which will pass ringing currents and talking currents must necessarily be a compromise or average between the two extremes.

*(To be continued.)*

QUESTIONS IN TELEPHONY.

What is meant by ring-through and talk-through repeating coils?

What effect has the presence of a large amount of iron in the core of a repeating coil?

Why is the ordinary telephone transmitter induction coil inefficient as a ring-through repeating coil?

Why is a repeating coil with a large amount of iron in the core and a large winding inefficient as a talk-through coil?

What is the average frequency of voice currents? Of ringing currents?

In a ring-through, talk-through repeating coil what is meant by a compromise of design?

## Radio Telegraphy.

In the December 16 instalment of these lessons we gave a description of and illustrated the Weagant static neutralizing circuits for radio receiving systems, and in what follows is explained what is meant by "coding of wave lengths."

Many inventions have been brought out aiming at secret wireless transmission and reception. These have been given various designations, such as selective, tuned, secret, etc.

One method which has been employed with considerable success is that provided with mechanical means for coding the lengths of the transmitted waves.

A station set using this scheme and operated by the United States Signal Corps has an eighty-foot mast with rubber-covered counterpoise, the natural wave length of the aerial being 450 meters and the capacity about .0011 mf.

The great advantage of this set lies in the fact that any desired wave length from 675 to 2,200 meters can be sent out at will, and if the wave length is changed after every word of a message, according to a prearranged code of wave lengths. For example, if the first word is sent with 700 meters, the next with 2,100, the next with 1,400, and so on through any series of changes agreed upon, it will be difficult for an eavesdropping operator, who has not the wave length code, to follow the change of wave length with any success; therefore it is possible to keep the nature of the message secret even when transmitted in plain English.

This requires considerable experience on the part of the sending operator and an assistant, the latter making the necessary readjustments of the loading coils and variometers at a signal from the sending operator.

With the set used by the Signal Corps the best transmission results are obtained at a wave length of about 1,000 meters, where the antenna hot-wire ammeter reads about 7¼ amperes, and in arranging a code schedule it is necessary to make experimental determination of the combinations of loading coils and variometers necessary to produce the best radiation for all wave lengths within the range of the set, and to tabulate these in a convenient and easily readable form.

For distances up to seventy-five miles over average land, the falling off of energy due to the use of the longest wave length will not be so great as to prevent the use of any wave length within the limits of the set (675—2,200), but beyond that distance, up to the extreme daylight distance of the set, about 185 miles, it is advisable not to work with any wave length exceeding 1,800 meters.

Different codes of wave lengths, differing by many meters from each other, may be agreed upon, to be changed daily in actual work, and made known only to the operators concerned.

*(To be continued)*

QUESTIONS IN RADIO TELEGRAPHY.

In what respect does the Weagant static neutralizing circuit differ from an ordinary tuned receiving circuit?

What is meant by the term "counterpoise"?

What is meant by coding of wave lengths in radio transmission?

## Shop Talk.

BY THE OBSERVER.

When the prospectus of the American Correspondence School announcing the Testing and Regu-

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lating Course arranged jointly with the Western Union was ready, I read therein words which implied that this course was intended especially for young men; that those who had already risen in the field, while welcome to participate, might possibly waste their time and money. Now the question arises: When is a man too old for intellectual advancement? I will answer without any hesitancy: "Never too old as long as life shall last." Hence it is that while I appreciate the honesty of President Miller of the American Correspondence School in making that statement, and I also appreciate the fact that practically all corporations like to select "young men" for advancement, still that bugbear ever hovers: Where is the dividing line between youth and old age? There can be but one correct answer and that is, it depends upon the infliction of infirmities, for many men are still as active mentally at the age of seventy years as those in their twenties, just out of college, and in fact the old fellow has the advantage of fifty years of practical experience. Now, that is a truth, and being the truth, let us go into the subject along other lines of reasoning. The prospectus laying strength upon the fact that young men were specially intended, is it not a fact that men past forty-five would so construe it, that owing to their age, there was no need for them to enroll? I think this is logical reasoning, but is it final? Decidedly not! Now, as there are many men at seventy active mentally and physically, surely all men at forty-five have reason to expect at least twenty-five years more of active participation in the world's work, and as the completion of the Testing and Regulating Course may be accomplished within two years, surely no one not past sixty years of age shall deny himself the intellectual uplift such as will happen to anyone completing the Testing and Regulating Course referred to. Think of a man at forty-five, or fifty, sidestepping such a fountain of knowledge and going intellectually thirsty for the remainder of his life, simply because forty-five years of age has been the mark placed upon contenders for many civil service examinations, and for some silly reasons that a man is old at forty-five! Why, it is to laugh, if it were not so serious. Many men do not settle down to seriousness until they are close to forty; then it will require several years before they realize they are serious. About the time they realize they are serious, the age of forty-five has arrived and now they are too old! Too old for what? Too old to play the fool longer, but ready to tackle anything that requires man-power. Hence it is that I say to all of the telegraph and telephone people between the ages of eighteen and sixty: Study methodically as long as life shall last and never mind who calls you old. The greater you store up your mind with things, clean, wholesome and necessary the more you will enjoy life, the easier your work will seem and, perhaps, there may come a time when the so-called young man with no thoughts except those immature, will have to stand aside for the one who though old according to the calendar is young intellectually and, being intellectual, will take the post of leader and lead in salary, title and prove that only some infirmities are barriers, and even infirmities, sad as it is to reflect upon them, may occur in various ways and some are not barriers after all.

*(To be continued.)*

## Proper Care of Electrical Measuring Instruments.

Do not stand a moving coil instrument on top of an excited electric generator.

Do not connect up an ammeter without its shunt, or a voltmeter without its series resistance.

Do not connect an ammeter across the mains of a power circuit.

Do not connect a voltmeter with an ammeter shunt.

A permanent magnet instrument will not measure alternating currents, and should not be expected to.

If an instrument is provided with a pointer catch, the catch should be released before the instrument is required to express itself.

Do not ship switchboards with measuring instruments bolted to them. The meters should be packed separately, and very carefully.

If a meter has to be sent to the manufacturers for repair, you will save money and time if you state as near as you can what is the matter with the instrument.

## Telegraph Technical Papers.

During the year 1918 the following important technical papers appeared in TELEGRAPH AND TELEPHONE AGE:

Methods of Pole Line Construction. By J. C. Martine. April 1.

Principle and Theory of Phantoms. By S. A. Kraus. May 16.

Standards for Telegraphy and Telephony. June 16.

Vibroplex Sending. June 16.

Calculating Current Strength in A. C. Circuits. June 16.

The Flow of Current in Electrical Circuits. July 1.

Telephone Wire Chief's Centralized Testing Bureau. July 16.

Injury From Electric Shock. July 16.

Telephone and Telegraph Cable Capacity. August 1.

Insulation Test of Submarine Cables. August 16.

The Telepost System. August 16.

Western Electric Company's Railway Selectors. September 1.

The Evolution of High Speed Telegraphy. September 16.

High Speed Telegraphy in Great Britain. October 1.

Atmospheric Electricity. October 1.

Ground Connections For Electrical Systems October 1.

The Oscillograph for the Telegraph and Telephone Laboratory. October 16.

Resistance of Earth Contacts. October 16.

Operating Speed Over Submarine Cables. November 16.

Hard Drawn Copper Wire. November 16.

The Trigonometry of Ohm's Law. December 16.

Improving Polar Duplex Operation. December 16.

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# THE UNDULATOR

BY JOHN H. BELL, TELEGRAPH ENGINEER, WESTERN ELECTRIC COMPANY, INC.

The undulator derives its name from the undulating wave shape of the signals which it produces on the paper tape. It was invented by Lauritsen, a Danish telegraph engineer, but has undergone several modifications since it was first brought out in 1876.

In Europe it is used on long land lines and on submarine cables up to 400 or 500 miles in length, in the same manner as the Wheatstone recorder. In this country its use, so far, is confined to multiplex printer circuits and its special function is to enable the attendants to secure satisfactory duplex balance conditions and to make observations on the line conditions.

It consists of two essential parts: the electrical portion termed the undulator head, and the paper pulling mechanism.

The head consists of two electromagnets, each wound to a resistance of 400 ohms. From the upper and lower ends of the cores of both electromagnets project polepieces, PP, Fig. 1. The electromagnets are so mounted that they can be brought closer together or more widely separated, thereby changing the air gaps between the polepieces and the pivoted armature A which is vertically mounted as shown in Fig. 1.

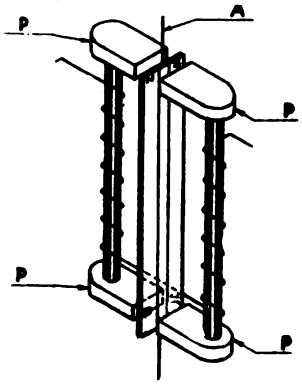


FIG. 1.

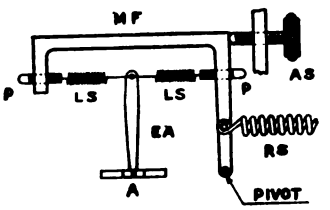


FIG. 2.

This armature consists of two small bar magnets firmly fixed to an aluminum spindle which has steel extensions for pivoting.

The magnets are mounted so that their adjacent poles are opposed. When a positive current is passed through the windings of the electromagnets, the adjacent polepieces are oppositely magnetized, so that the armature tends to rotate in one direction. When a negative current passes through the windings of the electromagnets the magnetism of the polepieces is reversed and the armature swings round in the opposite direction.

In order to hold the armature in the mid or zero position two light springs, LS Fig. 2, are connected to a small extension arm, EA, which projects at right angles from the armature A. The other ends of these two springs are fixed to threaded pins P, which screw into a metal framework MF. The threaded pins may be screwed in or unscrewed, thereby regulating the tension of the light springs.

This adjustment, however, is one that is seldom necessary to alter in the field.

When the polepieces have been closed so as to grip the armature, the two light springs should have equal tension, otherwise when the polepieces are opened up and the armature freed, the latter will swing over to the side where the greater pull exists. In order to simplify this adjustment and also to enable the instrument to be operated despite the existence of a bias to the signals, the metal framework MF is mounted so as to swing through a small arc. The strong retractile spring RS and the adjusting screw AS act against each other and hold the framework MF in whatever position it may be placed by the adjustment of the screw AS.

The inking device consists of a fine silver or glass tube shaped as shown in Fig. 3, mounted on a brass saddle by means of beeswax. The saddle is readily removable from the upper end of the steel extension of the armature spindle.

One end of the tube dips into the inkwell and the other end marks on the paper tape.

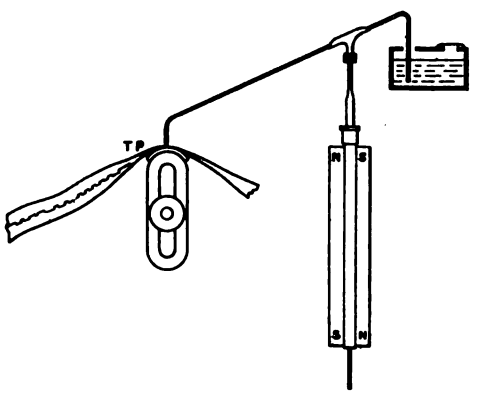


FIG. 3.

All the parts described so far comprise the undulator head. The head is mounted so that it may be tilted up to raise the pen from the paper. This is effected by means of an eccentric, which is controlled by a small lever. When released by the eccentric cam, the head drops until its base rests against a limiting stop which is adjustable.

The tape platen is half round, and is mounted on an arm which may be set at any angle at any suitable height, so as to permit of pens of different lengths being used.

The paper-pulling device consists of a small electric motor which transmits its power through a friction drive to a milled wheel. A second wheel presses on the milled wheel, thereby engaging the paper tape and pulling it forward.



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The paper tape in the form of a roll rests in a horizontal position on a light wheel fitted in a drawer in the base of the instrument.

It is withdrawn through a slot in the upper part of the base and after passing over and under guides it is brought over the writing platform, hence to the paper pulling wheels.

The electrical connections are shown in Fig. 4. It will be observed that means are provided for shunting the electromagnet coils.

The function of shunting the coils is to keep the amplitude of the signals within the limits of the paper tape.

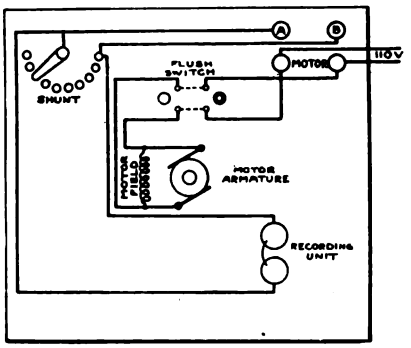


FIG. 4.

ADJUSTMENT.

Having first disconnected the instrument from the line and adjusted the limiting stop and the tape platen so that the pen rests lightly on the paper, the coils should be closed up until the polepieces grip the armature. The armature is then in its central or zero position, so that the pen should rest in the middle of the paper tape. If it does not rest in this position the small screw holding the saddle should be loosened and the saddle twisted round, carrying with it the pen. Tighten the saddle. Then the coils should be opened so as to free the armature. If no bias exists the pen will remain in the middle of the paper. If the pen swings over to one side or the other it should be brought back to the zero position by adjusting the proper screw.

The shunt should now be placed on the second stud, marked 100, and the instrument connected up.

The amplitude and shape of the signals can be regulated by three means:

1. Shunt.
2. Air gaps between armature and polepieces.
3. Pressure of pen on paper.

If square-topped signals are desired—and these are the most easily read—the shunt should be of as high resistance as possible, the airgaps fairly wide and the pressure of the pen on the paper as light as possible. On land lines where the undulator is connected direct to the line there is generally sufficient current to permit of approximately square-topped waves being produced, provided the speed is not too high.

It requires some practice before one can obtain the best possible wave shape.

Fig. 5 shows different records obtained by different adjustments, the same strength of signals being received in each case.

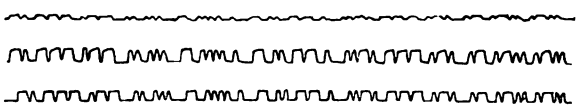

FIG. 5.

Clearly the undulator cannot be used as a means of showing the current wave, such as that produced by an oscillograph.

Care should be taken to see that the inkwell is not raised so high as to cause the end of the siphon which dips into it to touch the bottom.

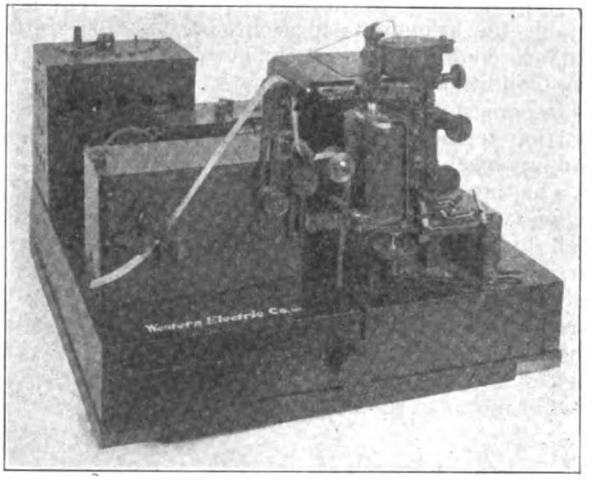

FIG. 6.

In order that the ink shall not dry up inside the siphon it is necessary that the siphon be cleared of ink at the end of the day's work. This can be done either by removing the siphon and its saddle and allowing it to remain in alcohol or water, or by turning down the inkwell and blowing out all the ink by means of a rubber bulb. The former method is the more reliable.

Fig. 6 shows the complete instrument.

## Voltmeter Test for Earth Currents.

To make the test, remove all regular battery from the line. Ground the line at both ends; that is, at each terminal of the wire under test. Connect the voltmeter into the line at the switchboard by means of a double wedge. This will connect the voltmeter direct from line to ground. If when the meter circuit is closed while the binding post marked (+) is to line and the indicating needle moves to the right, then the ground at the distant station is positive to the home ground. If the needle swings to the left reverse the wedge so that the post marked (+) connects with the home station ground, in which case the ground at the distant station will be negative to the home station ground.

In noting the readings the report should show the polarity, also the maximum and minimum potential in each case.

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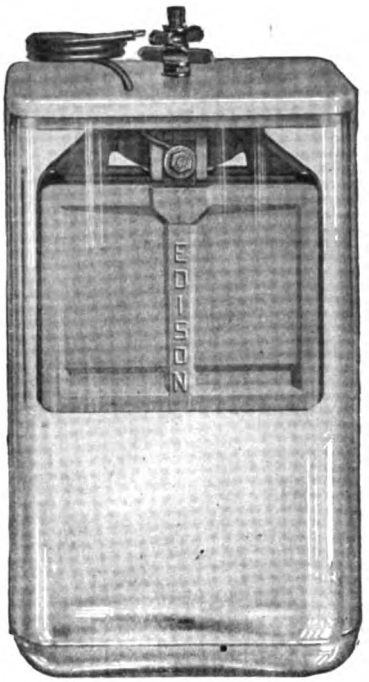
# FOR CLEAR TRANSMISSION




**EDISON PRIMARY BATTERY DIVISION**
**THOMAS A. EDISON, Inc.**
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# Hall Switch & Signal Co.

**GARWOOD, N. J.** **CHICAGO**

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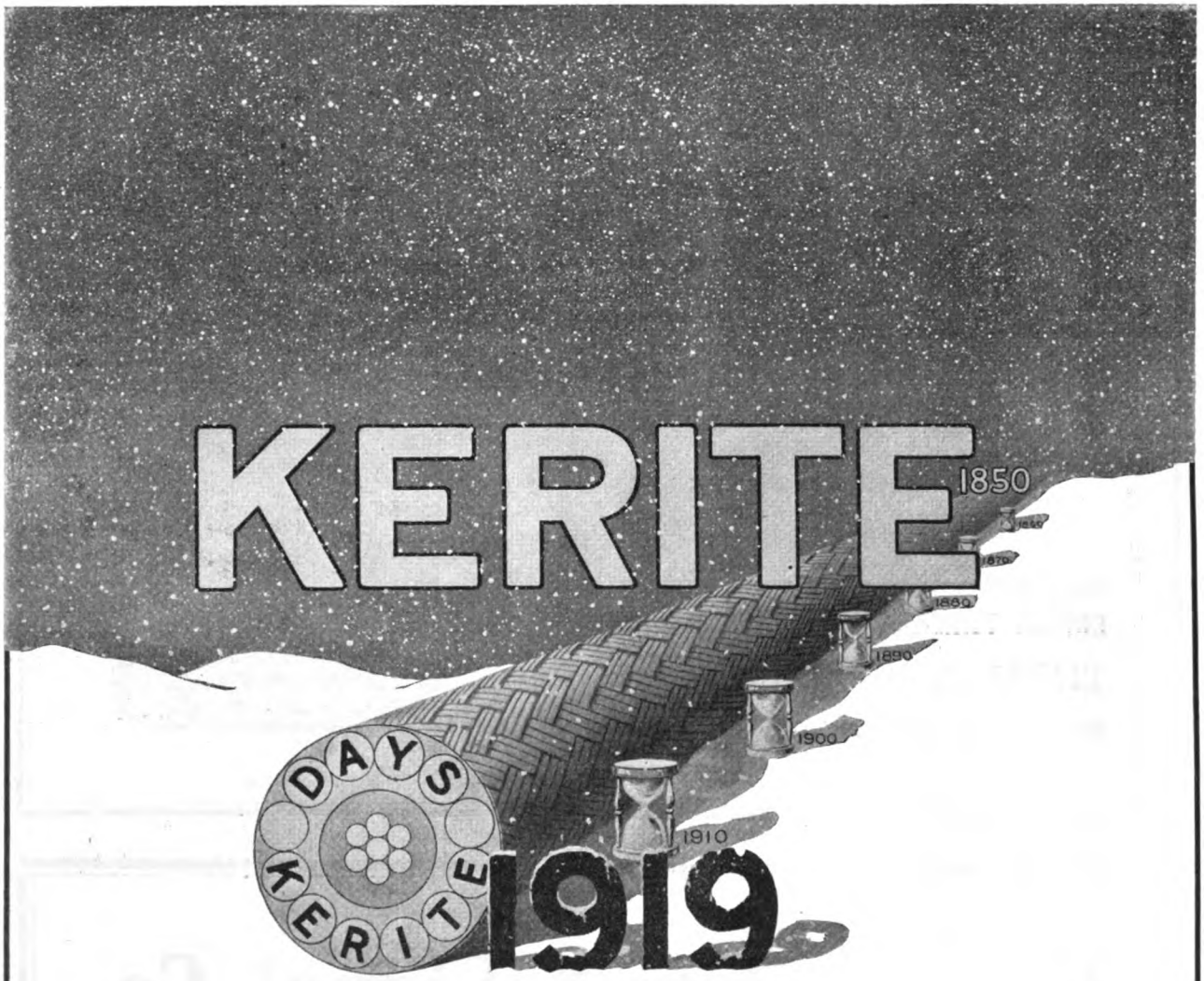


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PERFORMANCE RECORD OF KERITE

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## THE RAILROAD.

THE TERMINAL MANAGER of the southwestern region, United States Railroad Administration, St. Louis, Mo., announces that effective December 1, the jurisdiction of F. E. Bentley, superintendent telegraph, is extended over the following lines: Alton and Southern Railroad, Litchfied and Madison Railroad, East St. Louis National Stock Yards Railroad, St. Louis National Stock Yards Railroad, St. Louis, Troy and Eastern Railroad.

Effective December 1, the following appointments were made:

J. C. Browne, assistant superintendent of telegraph, headquarters St. Louis, Mo., with jurisdiction over the following lines:

Missouri Pacific Railroad, Memphis, Dallas and Gulf Railroad, Arkansas Central Railroad, Natchez and Southern Railroad, Natchez and Louisiana Railroad Transfer, Coal Belt Electric Railroad.

W. J. Williams, assistant superintendent of telegraph, performing similar duties as heretofore, headquarters Pine Bluff, Ark., with jurisdiction over the following lines:

St. Louis Southwestern Railroad, Louisiana and Arkansas Railroad, Southern Illinois and Missouri Bridge.

C. E. Wynne, supervisor of telegraph, headquarters St. Louis, Mo., vice J. C. Browne, promoted.

L. C. Redmond, assistant supervisor of telegraph, headquarters Sedalia, Mo.

P. F. McKinney, assistant supervisor of telegraph, headquarters Little Rock, Ark.

## MUNICIPAL.

### Municipal Electrical Improvements in Philadelphia.

James R. McLaughlin, chief of the electrical bureau of the city of Philadelphia, has under way plans for improving the character and reliabiity of the fire and police signal circuits in that city.

During the year 1918 five miles of underground cable were laid in the streets and determined efforts are promised within the next year to increase the footage of underground police and fire cables. Director Wilson has urged an appropriation of $250,000, to be made at the rate of $50,000 each year until the work has been completed. The city has at present for police and fire purposes a total of 1,679 miles of overhead wires. During the past year thirty-one miles of overhead wires were eliminated. The number of feet installed underground for police and fire cables from January 1 to October 1 this year reached 472,882 feet, or approximately 89½ miles. The total number of police and fire conductors placed in service from January to October reached 1,497,457 conductor feet. Chief McLaughlin plans to instal 250 fire signal boxes in different sections of the city, and adjacent to large industrial plants.

## INDUSTRIAL.

### The Western Electric Company's Plan for Former Employees Now in Military Service.

Former employees who have been given a leave of absence for military service and who have been honorably discharged therefrom and who desire to again take up work in the company, should make application within thirty days after being mustered out of service.

If possible they will be promptly assigned to work for which their previous experience qualified them at the rate of pay which others are then being paid for similar work.

If it is not possible to assign them to work immediately, they will be placed on a preferred list until such time as business conditions enable the company to place them. During their continuance on this preferred list they will enjoy the same rights with respect to the employees' benefit plan as they had while in the service of the United States, and they may take other employment.

When they are notified of a vacancy they should present themselves for work at the time stated and failing to present themselves for ten days thereafter their leave of absence shall terminate.

Before assignment to any work, their suitable physical condition for such work must be determined in accordance with the regular routine.

### Frank A. Ketcham Becomes General Sales Manager of the Western Electric Company.

Effective January 1, Frank A. Ketcham becomes general sales manager of the Western Electric Company with headquarters at New York.

Mr. Ketcham takes the place of Gerard Swope, who resumes active service as manager of the export and foreign business of the company.

Mr. Ketcham is a native of the State of Michigan, having been born in Saginaw, in 1875, and educated at the University of Michigan. He has been associated with the Western Electric Company since 1900.

HUGH J. PRITCHARD, New York, has been appointed president of the National Conduit and Cable Company, to succeed George J. Jackson, deceased. G. H. Hawley, formerly with the Ansonia Brass and Copper Company, has been elected a vice-president of the company in charge of manufacture.

### An Operator's Repeater.

Commercial telegraph companies and railroad telegraph departments frequently find it advantageous to install a repeater at an office where there is but one operator stationed. There is a natural hesitancy in installing repeaters where there is no expert supervision. The J.-C. Repeater, manufactured by the Jester-Cooper Company, Houston, Tex., meets these conditions admirably.

The old wire chief says: "I often wonder how we got along without the little differential millammeters on each duplex set. It's a good thing we didn't have the buzzing wigwags in those days."

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## Protection Against Lightning and High-Tension Circuits.

At the Chicago convention of the Association of Railway Telegraph Superintendents, special committee No. 5, J. F. Caskey, chairman, having in hand the above subject, made the following report:

It has been decided that for the purpose of this report attention should be concentrated on "Protection used at telephone stations owned by the railways."

Telephone lines and apparatus, due to their importance for railroad purposes and to their delicacy and sensitiveness, are given first consideration.

The recommendations are not intended to cover protectors on lines and apparatus owned by telephone companies or on leased lines entering leased switchboards where telephone companies demand and insist upon protection according to their standards.

While this report is made to cover protectors used at telephone stations owned by the railroads, we can see no objections to the same protector requirements being applied to the telegraph stations under railroad control provided this practice would not conflict with those of telegraph companies where they are concerned.

A list of ten questions bearing on the subject was formulated and forwarded to the members of the association. The information obtained is instructive, valuable and has a direct bearing on the rules and recommendations which are submitted.

Without quoting the substance of the questionnaire, the concrete results are as follows:

### TYPES OF ARRESTERS IN USE.

Forty-six types of arresters are reported as being used, some of them probably of the same type but differently described, namely: Western Electric 12A, 12B, 58A, 58B, 59A, 60A, 61A, 79A, 86A. (Pole Arrester), 86B (Pole Arrester), W. E. Glass Vacuum, W. E. Metal Vacuum, W. E. Vacuum No. 120,275 and 148,057, G. E. Copper Tube Vacuum, Western Union Standard Carbon and Micas and Western Union type 2,176.

Brach Carborundum, Brach Glass Vacuum, Brach type No. 26 Vacuum, Brach type No. 30, Brach type No. 35 Vacuum, Brach type No. 36, Brach No. 40B Special Vacuum, Brach Cartridge No. 40 and Brach type No. 150.

D. and W. Nos. 2,751, 2,752, 2,753 and 3,104.
Reliable Electric Co., Nos. 975 and 998.
Vac. M. Primo Giant type and Vac. M. No. 3.
Argus types A, B and C.
N. W. Electric Equipment Co. (St. Paul), Block No. 403.
Mason Nos. 2,000 and 3,000.
S. and H. Vac. glass tube cartridges.
Postal Telegraph-Cable No. 65.
Homer Roberts.
N. Y. Central Standard 2,749 fuse block.
Chapman (Pole Arrester).
Hayrake (Pole Arrester).

While the questionnaire asked for information as to the number of each type in use, this information was omitted in many replies, making it impracticable for the committee to furnish satisfactory information as to the preponderating types used. In expressing opinions as to the qualities of the protection used and the experience with same the objectionable features can be placed in the following groups:

Vacuum arresters of all types do not maintain their low voltage breakdown at all times and it is difficult to determine the condition of the vacuum.

Glass vacuum arresters are easily broken both in handling and in operation.

Porcelain base arresters are easily broken in handling, by warping of woodwork on which mounted and in operation.

Carbon brick arresters sometimes remain grounded after operation, necessitating frequent attention, the insertion of heavier micas or the substitution of copper bricks in place of carbon.

In air gap arresters the air gap space is not always maintained at its low voltage breakdown point, thus losing their efficiency except in cases of relatively high voltage discharges.

### FUSES.

In reporting on the ampere capacity of the fuses which are used with the different types of arresters, we find that they range all the way from one-half ampere up to twenty amperes as follows: .5, .8, 1, 3, 5, 7, 10, 15 and 20 amperes, most of those used being seven and ten amperes, showing a wide difference and indicating a lack of standard and uniform practice such as would appear to be necessary for maximum protection with minimum interruption to service.

### METHOD OF CONNECTING FUSES AND PROTECTORS.

The majority of the sketches furnished showing methods of connecting the different types of protectors used with respect to line and instruments indicate a rather close adherence to the essential protection as called for in Mr. Clapp's paper read at the St. Louis convention in May, 1913, as follows:

(a) A high capacity line fuse.

(b) An open space or cutout or lightning arrester such as formed by the use of carbon or metallic blocks mounted with a separation either in the air or in a vacuum.

(c) A low capacity fuse or heat coil.

These protective appliances are placed in the following sequence: Wires enter stations through a high capacity line fuse, then connected to an open space cutout or lightning arrester bridged from line to ground followed by a low capacity fuse or heat coil between the arrester and telephone equipment.

However, a number of replies indicate that good results have been obtained by placing the open space cutout or the lightning arrester next to the line followed by fuses between the arrester and the telephone equipment, often without a low capacity fuse or heat coil. In some cases duplicate arresters are placed in multiple.

*(To be continued.)*

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The Old Wire Chief says: "It may be that the real reason why Mr. Carnegie became rich and useful in a large way was that he never worried about the little things that trouble you and me."

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## Efficiency Engineering.

(*Continued from page* 581, *December* 16, 1918.)

Court decisions are usually founded upon precedent. If what others have done before us is reasonable and sound, it is safe for us to adopt, and as we can point to precedent for our authority, our action is deemed wise. It is the same all through the human and mechanical machinery that go to make up a nation. Individuals select someone they admire as models to follow. We have all had someone to look to as an example and no one has ever failed to be benefited by so doing, provided he made a good selection.

The average successful man of business first of all selects fixed hours for business, relaxation, pleasure and exercise, devoting so much time to each and allowing nothing to interfere with his schedule.

The president of one of the large telegraph companies once informed us that when he left his office at 5 P. M., he never once thought of business again until 9 A. M. the next day. By so doing he found that he was in excellent shape to take up the duties of his office and pass on the matters that came before him with reasonable promptness and accuracy.

A successful man gathers about him assistants and clerical help of the superior sort, and those who give promise of future success he naturally trains and develops in his method of transacting business.

A good business man would seldom dismiss an assistant. He would rather instill the feeling in him that the company is one family, the success of one unit affecting all.

A good business man subscribes to newspapers and trade journals which make a specialty of gathering news and ideas helpful to the business, and after reading them passes them along to his assistants for their benefit, and for the improvement of the service.

A good business man would cause each customer who entered the office to feel that he was among friends and he would insist upon the same treatment being accorded to the patrons of the company by everyone in the service.

A good business man pays close attention to all of the details of his office and welcomes subordinates asking questions of him that they themselves could not readily decide.

A good business man will always pay his bills promptly, particularly the very small ones, for he realizes that if he is rated as slow pay in the community it is a serious handicap to his advancement in that community or in the business world at large.

A good business man will invite and thank his associates or assistants for advice and suggestions relating to the business and would give a hearing and act the part of a courteous gentleman, and never assume the attitude of a bully or a boss.

A good business man would study all of the advertisements and literature, rules, etc., of his competing company, note what is worthy of extra thought and pass them on through the office to be digested.

A good business man remembers all charities within reason, knowing a man can never get poor helping worthy causes.

A good business man will spend a little of his time each day mingling with those who have to report to him, ask them if they have any problems to solve which seem difficult and in this way keep in close touch with the help in the office. The personal element is a strong factor in smoothing over rough spots in the business routine of a busy office.

A good business man, in brief, conducts the affairs of his office according to the golden rule. In so doing he knows that no one can take exception to his methods. *(To be continued.)*

## Telegraph and Telephone Development.

At the convention of the Association of Railway Telegraph Superintendents, held in Chicago, December 5 and 6, special committee No. 6, E. C. Keenan, chairman, made a report reading in part as follows:

DEVELOPMENT OF USE OF TELEPHONE IN TRANSMITTING TRAIN ORDERS.

The following comparative statement shows use on January 1, 1916, and January 1, 1918, of telegraph and telephone in transmitting train orders as indicated by the Interstate Commerce Commission reports.

| Date | Total Miles of Road | Telegraph Miles of Road | Telephone Miles of Road | % of Road operated by Telegraph | % of Miles of Road operated by Telephone |
|---|---|---|---|---|---|
| January 1, 1916 | 245,319 | 151,605 | 99,249 | 61.8 | 40.4 |
| January 1, 1918 | 244,355 | 142,119 | 110,404 | 58.2 | 45.2 |
| | A963 | A9,486 | B11,155 | | |

A—Decrease
B—Increase

The small increase, or 5 per cent of the mileage at the first of this year over the conditions January 1, 1916, is undoubtedly due to the fact that most of the trunk line railroads now have the telephone in use, the small roads being deterred from installing the telephone by the high cost of copper, etc.

## Feud Between Operators Given as Reason for Poor Telephone Service.

A feud exists between the telephone operators of Coquille, Oregon, and Myrtle Point, Oregon, and for that reason Coquille operators refuse to give Myrtle Point people proper service, according to an answer filed by Myrtle Point with the Oregon Public Service Commission to the application of the Coos and Curry County Telephone Company for increased rates.

The answer also avers that this feud is the main cause for poor service rather than poor equipment. It is charged that the company wishes to use the money received from increased rates to extend its line rather than better its service.

In an answer filed by the City of Coquille to the same application, the city states that the increases will cause a reduction in the volume of business which will defeat the end which the company is seeking to attain.

The Old Wire Chief says: "Quitting your job and joining the circus is a poor way to get adventure. You can find the real thing in good books without leaving home."

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# THE RAILWAYS OF GREAT BRITAIN.

BY T. P. McBEY, CAMERON LAKE, B. C., CANADA.

In the November 16 issue of TELEGRAPH AND TELEPHONE AGE your correspondent writing on The Railways of Japan states that they are run on the same system as used in England and Russia for movement of trains; viz., the use of train staff.

If my memory serves me right, it having been sixteen years since I severed my employment with the Caledonian, London and Northwestern Railways, trains in Great Britain are run by the electric train telegraph and lock and block system. Only on very short lines are the staffs in use. These lines are mostly used for slow, heavy mineral trains hauling coal from the collieries to the various junctions on the main lines, thence to the large seaports for shipment abroad.

No station master dispatches trains further than to notify the guard or conductor that all the duties pertaining to his particular train have been performed and that the train may proceed whenever the schedule time of departure arrives.

A train starting from its terminal point moves away only when the semaphore arm signal has been dropped or lowered to clear the track for that particular train. The next section ahead must be absolutely clear before the train can move into it, except that when there is a breakdown of the signaling apparatus or other obstruction trains can be brought forward by the special rule and under caution.

Three to four miles generally constitutes the length of a section. In each section there are three semaphore signals displayed for any train, in whichever direction it travels. The distant signal is about one mile from the signal tower or cabin, the home signal midway, and the starting or advance signal just about opposite that cabin.

Every signalman is a proficient Continental or universal code operator who has undergone special training in the train rules and working regulations. After passing a very stiff examination he is appointed to some of the smaller signal cabins, where he gains his initial experience working the signal levers under the supervision of a relief man or special agent sent for the purpose. When he has become proficient, self-confident and reliable, promotion may be expected for him to some more important point. Promotions are made only on ability. Where men are equal in ability, then seniority counts. Ratings increase proportionately as the work and responsibility.

In the larger junctions the work is strenuous where trains are passing each and every minute. A clear head and calm demeanor must be maintained at all times in order to keep traffic on the move and without the least interruption.

Trains are signaled forward from one section to another by electric plunger bells and according to classification. For instance, an express passenger train gets four distinct bells. If the section ahead is clear, these are answered by two pause one bells from the advance cabin, which also lowers a small semaphore lever in a miniature block apparatus at the cabin from which train is proceeding. These latter bells are again acknowledged by one bell, indicating "signal understood, train is proceeding," or, in other words, "all clear." It is the right of way for a train to pass through that section. This same process continues all along the route from one section to the next. No train needs to stop when signals are cleared except at regular stopping stations. There are mostly four running tracks in parallel, the two center tracks being kept for the fast moving trains. The slower ordinary passenger trains are often shunted from center to side tracks to clear for through expresses.

The distinguishing bells sent forward for each particular train are as follows:

Express passenger train—four bells.

Wreckgang trains in haste—four bells.

Through perishable goods train—one pause four bells.

Ordinary stopping passenger train—three pause one bell.

Light engine or engines coupled—two pause three bells.

Engine and van or caboose—three pause two bells.

Through mineral or coal train—four pause one bell.

Ordinary way freight train—three bells.

The OS signals for all trains are also sent forward from the more important junctions to the next important junctions by telegraph boys trained for this duty. There are two boys in some junction cabins. They keep a record of the passing time of every train and make out a daily record of any delays, giving the cause for same. These reports are sent into headquarters and from that beehive comes forth censure in plenty to the person or persons found guilty of delaying any of the through express trains.

Local batteries of thirty or more wet cells are required at each cabin to work the telegraph sets and the miniature semaphore sets. But at some junctions as many as 200 cells are in use. Linemen attend to these, as well as the inside and outside circuits and the replacing of parts to the miniatures. Linemen get two years' training in the shops where all electrical apparatus is repaired before being placed on a division. They are very efficient linemen. They may travel on any train when going to or from duty. In some countries linemen are appointed to positions as soon as they can climb and make a joint; not so in the land of "despicable little armies and tiny railways."

I thank you for the valuable aid I receive from reading and digesting the matter contained in TELEGRAPH AND TELEPHONE AGE. It is the paper prized most of all that I read.



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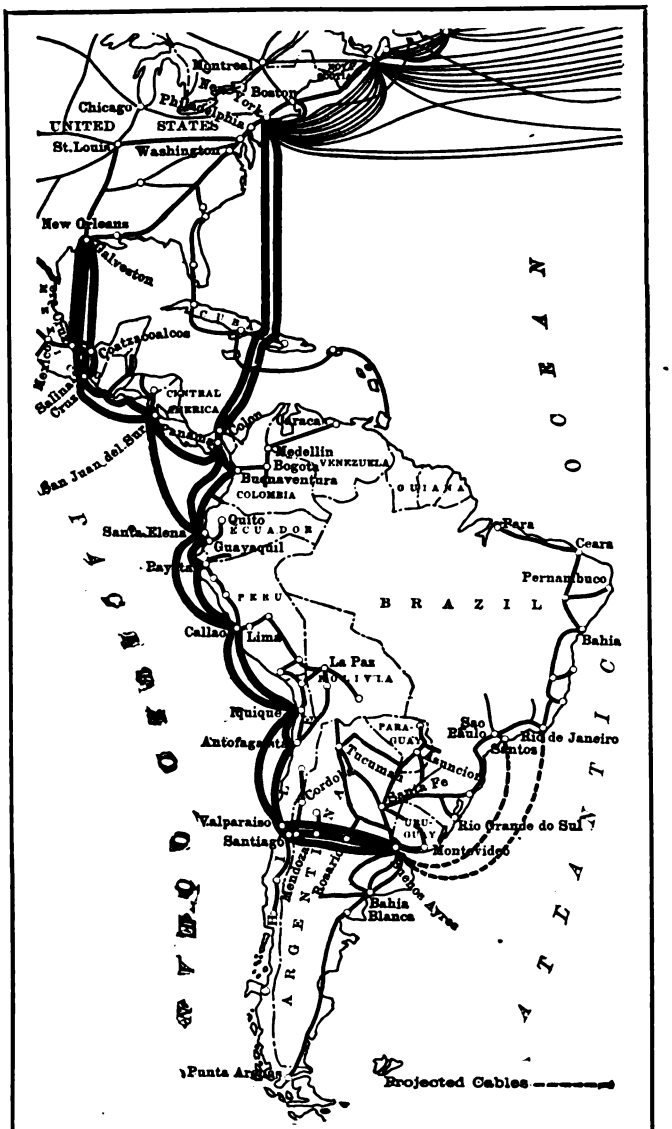


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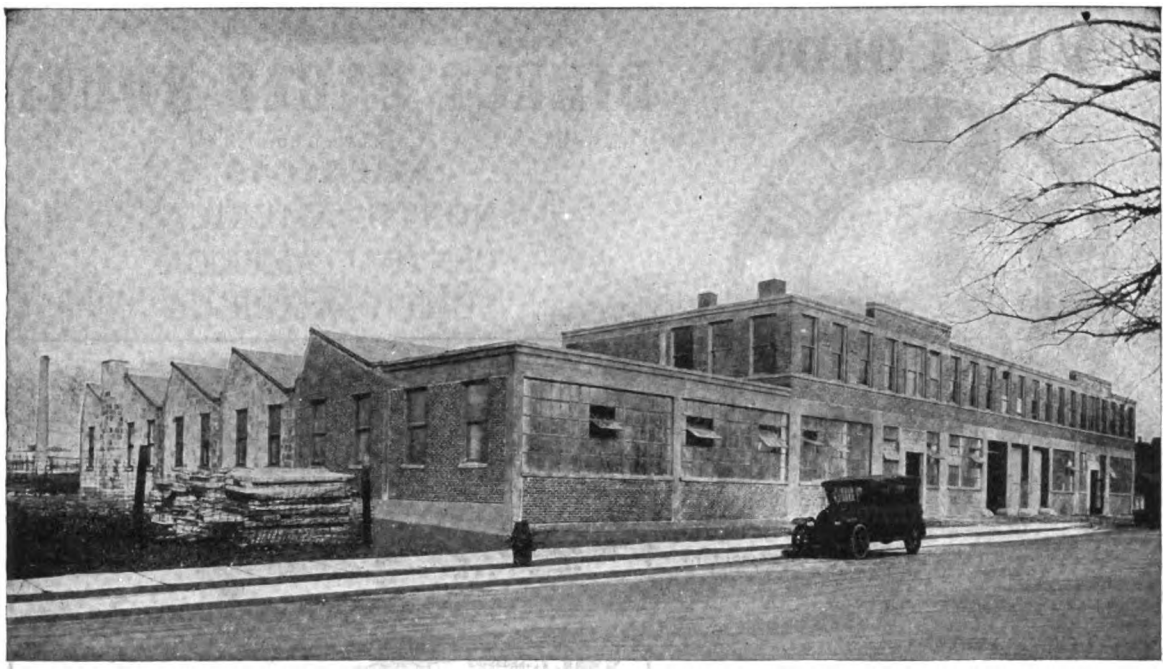

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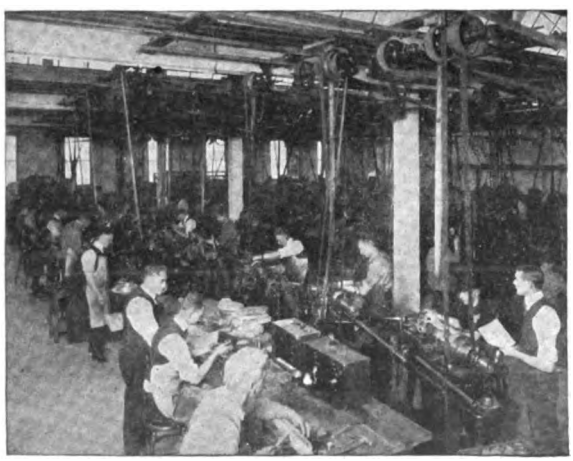

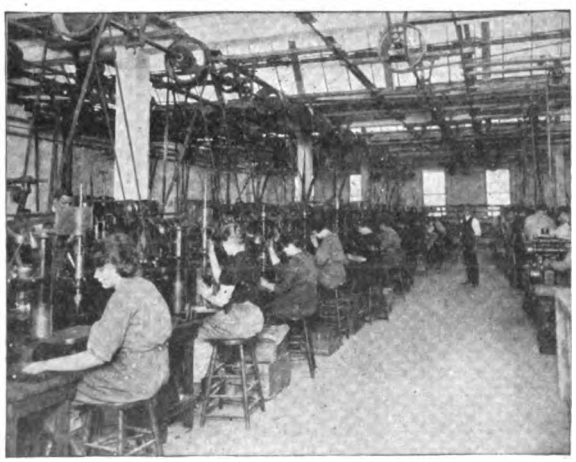

*Views of machine shop. Daylight conditions mean good work*


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## The Van Rysselberghe System of Simultaneous Telegraphy and Telephony, the Marshall Electrical Condenser, Etc.

(*Continued from page 418, September 16.*)

BY WM. MAVER, JR.

In Mr. Pickernell's paper read at Atlanta, Ga., in 1916, it is stated that since the date of the emergency use of the Van Rysselberghe System of simultaneous telegraphy and telephony on the circuits of the American Telephone and Telegraph Company in April of 1891, that system, "vastly improved, has been in continued use and has been of very great value to the company."

There is no doubt whatever that the Van Rysselberghe system has been of very great value to the said company and to certain telegraph companies and railroads of this country and Canada. Indeed, it may be said that this value has become enormous, and to this point I shall at more length return.

Mr. Pickernell's statement that the Van Rysselberghe system has been vastly improved since 1891, however, will perhaps not bear investigation. Professor Van Rysselberghe's invention was based on his discovery that the effects of the telegraph signals upon adjoining telephone circuits were in proportion to the abruptness of the rise and fall of the telegraph currents; and he devised methods of producing a gradual rise and fall of those currents which render the telegraph signals inaudible in the telephone receiver and thereby make simultaneous telegraph and telephone systems of the Van Rysselberghe type possible.

Professor Van Rysselberghe accomplished the purpose desired by a certain combination or arrangement of electromagnets and condensers in the telegraph circuits. The arrangement of electromagnets and condensers employed in the Van Rysselberghe system of simultaneous telegraphy and telephony today is substantially the arrangement devised and operated by Professor Van Rysselberghe in 1883-1885. Therefore, the statement that the Van Rysselberghe system of simultaneous telegraphy and telephony as employed in 1916 has been vastly improved since 1891 can only tend to lessen the importance of Professor Van Rysselberghe's original, novel and exceedingly valuable invention. Further, this invention was not only original with Professor Van Rysselberghe, but its essential details were worked out and employed by him; a rather unusual fact in connection with any important invention. As an illustration of this statement, take the surpassing invention of the telephone by Professor Alexander Graham Bell in 1876. The method and apparatus devised by Bell for the practice of telephony unquestionably constituted an operative system, and the patent covering it was held by the highest courts of the United States to be a valid and controlling patent. The Bell invention, however, was comprised in a device which, it cannot be gainsaid, has been vastly improved in practical telephony. Indeed, aside from the telephone receiver, no part of the apparatus of Bell's original invention is employed today in telephony; nevertheless Bell's outstanding invention of the telephone is, per se, the basis of the gigantic telephone industry of today.

In making the statement that the Van Rysselberghe system of simultaneous telegraphy and telephony as in operation today is virtually the system invented and operated by Van Rysselberghe, I am aware that the electromagnets now employed as a graduator in that system consist of a coil of wire having a resistance of about forty ohms, wound over a soft iron ring, whereas the inventor's original electromagnets had a resistance of 500 ohms, coiled over a bar of soft iron and enclosed in an iron sleeve. But this is merely a refinement of the apparatus that the advance in the knowledge of the laws of inductance would naturally suggest, and was fully anticipated by Van Rysselberghe and covered by his patents. Indeed, the inventor himself had found that electromagnets of much less resistance than 500 ohms could be employed. This is interestingly shown in the following telegram to me from Baltimore, Md., February 18, 1886: "I have found by experiment that two electros of about 100 or 150 ohms between top of three point switch and junction of real line and artificial branch with half microfarad between the two electros and half microfarad between the latter of both and the said junction do very nicely for graduating quads and, of course, this will not interfere with good working. Please take immediately your three actual electros and have them wound with other wire so as to get about 125 ohms on each. Will send you today four half microfarad condensers. Send me two differential phones as soon as made. Van Rysselberghe." Also, in my report of January 9, 1886, to Dr. Barnard, already quoted in Part II of this series of articles, I say: "It is not absolutely settled that the rather high resistance of the electromagnets as given will be required. Experiments may demonstrate that less will do. If this should happen this will be an advantage."

It may be of interest to note here that in nearly all of the experiments made with the Van Rysselberghe system on the wires of the Baltimore and Ohio Telegraph Company, 1885-86, the object was to apply that system to the Edison quadruplex telegraph. This was a severe handicap, because the electromotive force necessary in quadruplex telegraphy is from three to four times greater than in duplex telegraphy or single wire working. This increased the volume of the noises in the telephone receiver, due to the superimposed telegraph signals, and this in turn required increased resistance in the electromagnetic graduators, which increased resistance again entailed added electromotive force. But perhaps the main difficulty met with in the endeavor to operate quadruplex telegraphy in connection with the Van Rysselberghe system arose from the fact that the second or neutral side of the quadruplex system is affected adversely by retarded reversals of current on the line, and it is the function of the graduators of the Van Rysselberghe system to produce retardation of reversals. Notwithstanding this difficulty, a fair degree of success was obtained with simultaneous quadruplex telegraphy and telephony when the resistance of the electromagnets of the graduators was reduced to 250 ohms and less, as shown by my reports pre-

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viously quoted. Excellent results were obtained when the experiments were confined to single or duplex telegraph working. In operating the simultaneous system on single wire and polar duplex circuits, the original graduators, and condensers supplied by the inventor, gave silence in the telephone receiver without any perceptible lag in the manually operated telegraph portion of the system.

Reverting to Mr. Pickernell's mention of the great value of the Van Rysselberghe system to his company for the last twenty-five years:

In the first part of these articles it was noted that by means of the Van Rysselberghe system of simultaneous telegraphy and telephony, two telegraph circuits were obtainable from every commercial metallic telephone circuit within reasonable limitations. Reversely the two wires of two regular telegraph circuits may have superimposed on them a metallic telephone circuit, and this in a great many cases is now an accomplished fact. Indeed, this might be done in numberless additional cases if all telegraph lines were constructed so that they might be readily adaptable to telephone purposes. In this relation I may remark that as long ago as 1899, at a convention of the Association of Railway Telegraph Superintendents in Wilmington, N. C., I was asked by the chairman of the convention if there was any remedy for inductive disturbances in telephone circuits when superimposed on telegraph circuits. (To this query) I replied: "There is a simple cure, but it is rather an expensive one. The trouble heretofore, I think, has been that the railroad companies have built their wires for telegraph purposes only. If they would proceed on the basis of building them for telephonic purposes, then the wires would be sufficient for telegraphic purposes also, and that, I believe, is the whole thing in a nutshell."

To ascertain more or less definitely the monetary value of the Van Rysselberghe system to the telephone and other companies, let us assume that between New York and Boston there are fifty long distance telephone circuits. If these circuits were all equipped with the Van Rysselberghe devices, one hundred wires would at once become available for telegraph purposes. If only thirty of these wires should be leased to brokers or others and the rental value should be placed at five thousand dollars per annum, there is derived a revenue amounting to one hundred and fifty thousand dollars annually, directly due to the use of the Van Rysselberghe invention, between New York and Boston alone. Also, if the wires thus gained were used for regular commercial purposes they might all be duplexed, which would give the equivalent of four single Morse circuits from each metallic telephone circuit, by virtue of the Van Rysselberghe system. Further, if by the application of the Van Rysselberghe system to the long distance telephone circuits between New York and Chicago two or more circuits are set free for leasing or for regular telegraph purposes, a revenue of about eighteen thousand dollars per telegraph circuit per annum is thereby obtained. Obviously, the use of the Van Rysselberghe system need not be confined to circuits between the points mentioned.

This point, the great monetary value of the Van Rysselberghe system, becomes all the more remarkable when it is considered that the cost of the apparatus required to successfully superimpose the telegraph upon telephone circuits, or vice versa, is almost negligible; perhaps not two hundred dollars per telegraph circuit at each station, for the necessary condensers and electromagnets. Also, these instruments have no mechanical motion while in operation and, therefore, when properly made, last indefinitely. Furthermore, the telegraph circuits thus obtained have cost nothing to build or to maintain, since it may be assumed they would in any case be built and maintained for telephonic purposes. For as Mr. Pickernell states in his paper, "Up to this time" (1891) [that is prior to the employment of the Van Rysselberghe invention] "the leased wires of the American Telephone and Telegraph Company had made use of single wires and these wires were of no use for telephonic transmission."

Toward the end of Mr. Pickernell's paper it is remarked, "As it [the Van Rysselberghe system] became standardized, it became desirable to get a better name, and, accordingly, T. D. Lockwood was asked to name it. He selected what has seemed to most of us the appropriate name, 'Composite,' and in this way it has become the designation of an important branch of the long lines department of the American Telephone and Telegraph Company." Incidentally, the right of these gentlemen to assume the role of godfather to the Van Rysselberghe system may be questioned. They had nothing to do with its advent in this country. One of them had publicly declared its impracticability beforehand.

Without knowing who was responsible for applying this already overtaxed word to the Van Rysselberghe system, which is at best a combined system and in no sense a composite system, from the moment I first learned of the misnomer I have consistently opposed its use, not only as inappropriate, but also as unfair to the genius and memory of the illustrious inventor of the system.

Thus in discussion of a paper entitled "Some Instances of Composite Transmission and Compound Telephony," by T. D. Lockwood, presented to the Association of Railway Telegraph Superintendents at Wilmington, N. C., 1899, I said: "It is, I may first say, somewhat of a surprise to me that the name 'Composite' seems to have attached itself to this system. I do not see why it should be so termed. In the general mind I think the word 'composite' signifies a gathering together of different things and the making of another thing, as, for instance, a ball insulator. As you see it, it is a black insulator composed of a number of different ingredients. You cannot distinguish the different ingredients. Take, for instance, also, a composite photograph made up of a number of faces. You have a picture derived from all of the faces, but you could not identify any one of them. In simultaneous telephony and telegraphy you combine the two systems on wires. It seems to be proper and fair to call this dual system 'the Van Rysselberghe system,' after its inventor." So far as I am aware, these remarks did not elicit any comments.

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Again, at the convention of the same association at Indianapolis, Ind., 1904, I took occasion to say: " * * * I do not think that I ever knew of a term that was more inappropriate than 'composite' is for simultaneous telegraphy and telephony, etc.," and I again urged the association to use another name for simultaneous telegraphy and telephony before "composite" became too deeply rooted to dig it out. Apparently the matter had received consideration in telephonic circles since I first made this suggestion, for a talented young representative of the telephone interests then replied: "Concerning the term 'composite' * * * the sense in which the word is used is that the actual line current in simultaneous telephony and telegraphy is composed of two real components, these components being separated at the ends of the line. The components form a single current in the line, but are practically separate at the terminal." * * * "There may be theoretical objections to the term 'composite,' but it seems to be firmly established by general use." At the close of the meeting I pointed out to this speaker that the very first spoken words transmitted electrically employed a composite current; but apparently that fact had not suggested terming the Bell invention, a "composite" system. For my own part I have not yet been able to grasp the manner in which a combination of systems that provides on the one circuit two separate and distinct systems can at the same time be a composite system in a legitimate or sensible use of that word. In the course of Mr. Pickernell's paper of 1916 he states that he had "Rysselberghed" and "Van Rysselberghed" certain circuits, which terms it will be noted clearly designate what Mr. Pickernell had in mind, and certainly to a greater degree than does the word "composite."

Inasmuch as the gentleman who suggested the application of the term "composite" to the Van Rysselberghe system of simultaneous telegraphy and telephony is, I believe, an avowed precisian and a purist, it would seem that he must have recognized the incongruity of the term as thus applied. If a departure from the name of the inventor was so great a desideratum, any other word than "composite" would have served as a neologism, and perhaps might have been less confusing. Furthermore, in the quest for a name for the Van Rysselberghe invention, different from the inventor's name, a neologist might have selected a term expressive of the views held at a former time concerning that system, as has not infrequently happened in other cases. Thus the term "condenser" as applied to the electrical instrument now so well known by that name originated in the fact that it was at first supposed that the strong electrical effects observed were due to the condensation of an electrical fluid or fluids on the metal plate. Analogously the term "barnacle" might appropriately have been chosen as a neologism for the Van Rysselberghe simultaneous telegraph and telephone system. But why, as Mr. Pickernell states, it seemed so desirable to him and others that Van Rysselberghe's name should be dropped from his invention is rather singular. There was no question as to the novelty of the invention nor as to its growing value and importance. Those points had been demonstrated and admitted, as we learn from Mr. Pickernell's paper. Yet there exist several seeming indications, to which I shall refer, of a desire, in the earlier days of the use of its value, and to veil its employment. Incidentally it may be noted here that in a voluminous book on telephony published in this country having a one word title of six syllables, in the section on "composite" systems, no mention is made of Van Rysselberghe, although his system is described. Also, in the standard work on Telegraphy, published in Great Britain, 1906, mention is made of the Van Rysselberghe system as being extensively used in Belgium, but no reference whatever is made to the fact of its extensive use in this country at that time.

*(To be continued.)*

## Subway Conduit Company Wins Suit.

Ex-Judge Henry E. Lacombe, Adrian H. Larkin and George Gordon Battle, referees in the suit of the City of New York against the Empire City Subway Company, which controls the underground conduits for telegraph and telephone wires, for an accounting, have filed their report in the county clerk's office in favor of the subway company.

The city charged that in the last twenty-four years it had been defrauded out of millions of dollars through the concealment of records and the falsification of the Empire City Company's books, but the referees ruled unanimously that not only was there no evidence of fraudulent acts by the company, but that instead of owing millions to the city, the company had failed to earn, up to January 1, 1914, the full amount to which it was entitled under its contract for the construction of the subways by more than $2,600,000.

The contract referred to was made in 1891, and provided that the Empire City Company should earn ten per cent. on its cash capital invested in its subway conduits, and that all over ten per cent. was to be paid to the city. The action was brought in 1903, and had been pending for some years before the referees named were appointed to hear it. One of the contentions of the city was that because of the alleged improper acts of the Empire City Company its entire subway system should revert to the city. The referees ruled against the city on all points.

There is not much aristocracy to be found in the telegraph service, but some of the linemen can boast of "good connections"!

## Electrical Measurements and Meter Testing.

This is a plainly written book, by D. P. Moreton, suitable alike for the student and the practical man. The book is particularly valuable to the telegraph and telephone engineer, because it deals directly with the subjects with which they are particularly interested—the measurement of electrical wires, apparatus, etc. The voltmeter and the ammeter are the instruments used in this line of work, and these are to be found in all modern offices. Price $1.00 per copy. For sale by TELEGRAPH AND TELEPHONE AGE, J. B. Taltavall, publisher, 253 Broadway, New York.

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## Ocean Cable Systems.

Preliminary figures of the forthcoming quinquennial report on the ocean cable systems of the United States have been given out by Director Sam L. Rogers, of the Bureau of the Census, Department of Commerce. They were prepared under the supervision of Eugene F. Hartley, chief statistician for manufactures.

The companies making up the Ocean Telegraph totals for 1917 are, as in 1912:

Central and South American Telegraph Company, Commercial Cable Company of Cuba, Commercial Cable Company of New York, Commercial Pacific Cable Company, Mexican Telegraph Company and United States and Hayti Telegraph and Cable Company.

The statistics relate to the years ending December 31st, 1917, 1912 and 1907, and are subject to such revision as may be necessary after further examination of the original reports. The comparative statements as to details must be viewed in the light of the uniform system of accounts instituted by the Interstate Commerce Commission and followed by the Bureau of the Census since the publication of the reports for the census of 1912.

Among ocean cable systems is one system operated by a land telegraph company, but as the details for this were not segregated in the combined report submitted, they could not be included here and are made a part of the showing for land telegraph systems.

The mileage of ocean cables is that owned or leased by the operating companies and is the entire length of such cables wherever located. The financial statistics, therefore, concern to some extent operations in foreign countries. Statistics of merely holding companies and of federal governmental cables are excluded.

The figures show that for the five years, 1907 to 1912, as well as for ten years, 1907 to 1917, there were substantial gains. During the five years the miles of cables increased 4,759, or 7 per cent; during the ten years the increase was 26,134, or 56.4 per cent. The gain in number of cable messages was 609,948 or 10.4 per cent for the five years, and 581,911, or 9.9 per cent for the ten years.

During the five years the gain in gross income from ocean cable telegraph traffic was $7,597,272, or 94.2 per cent; and in net income $3,554,022, or 120.4 per cent. The ten year gain in these respects was $8,324,790, or 113.4 per cent, and $2,477,795, or 61.5 per cent respectively.

From the net income there was appropriated as provided for in such cases, according to the newly introduced accounting system of the Interstate Commerce Commission, $235,101 as charges for sinking fund and for appropriations for construction. In addition to the dividends declared from net income, an additional sum was declared from accumulated surplus and a considerable amount of stock was issued as stock dividends.

There was a slight decrease in profit and loss surplus during the five years, but the gain for the ten years was $2,717,980, or 77.7 per cent.

The amount of capital stock outstanding in 1917 was $60,900,000, or 9.8 per cent greater than in 1912. The gain in this respect during the ten years was $8,100,000, or 15.3 per cent. The number of employees, salaried and others, increased 310, or 18.7 per cent during the five years, and their total salaries and wages $597,337, or 51.2 per cent. For the ten years the increase in number was 759, or 62.9 per cent, and in salaries and wages $849,268, or 92.8 per cent.

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| | 1917 | 1912 | 1907 | P. C. of Inc. (Note 1) 1907-17 | 1912-17 | 1907-12 |
|---|---|---|---|---|---|---|
| Gross receipts from operation | $15,663,070 | $8,065,798 | $7,338,280 | 113.4 | 94.2 | 9.9 |
| Operating expenses | 8,346,102 | 4,214,264 | 2,373,339 | 251.7 | 98.0 | 77.6 |
| Net earnings from operation | 7,316,968 | 3,851,534 | 4,964,941 | 47.4 | 91.0 | -22.4 |
| Income from other sources | 1,085,988 | 403,576 | 333,420 | 225.7 | 169.1 | 21.0 |
| Gross income less operating expenses | 8,402,956 | 4,255,110 | 5,298,361 | 58.6 | 97.5 | -19.7 |
| Deductions from income (fixed charges) | 1,896,087 | 1,302,263 | 1,269,287 | 49.4 | 45.6 | 2.6 |
| Taxes | 1,305,664 | 54,554 | 30,308 | .... | ... | 80.0 |
| Interest | 364,375 | 1,160,000 | 1,160,000 | -68.6 | -68.6 | ... |
| Payments for use of leased lines | 226,048 | 87,709 | 78,979 | 186.2 | 157.7 | 11.1 |
| Net income | 6,506,869 | 2,952,847 | 4,029,074 | 61.5 | 120.4 | -26.7 |
| Dividends on stock | 2,651,697 | 3,040,200 | 2,533,041 | 4.7 | -12.8 | 20.0 |
| Surplus | 3,855,172 | Note 2 | 1,496,033 | 157.7 | ... | ... |

Note 1.—A minus sign ( - ) denotes decrease.
Note 2.—Deficit of $87,353 in 1912.

| | 1917 | 1912 | 1907 | P. C. of Inc. 1907-17 | 1912-17 | 1907-12 |
|---|---|---|---|---|---|---|
| Total | $ 8,346,102 | $4,214,264 | $2,373,339 | 251.7 | 98.0 | 77.6 |
| General operation and maintenance | 7,881,740 | 4,008,218 | 2,204,939 | 257.5 | 96.6 | 81.8 |
| Salaries and wages | 1,764,351 | 1,167,014 | 915,083 | 92.8 | 51.2 | 27.5 |
| Operation and maintenance, including legal expenses | 6,117,389 | 2,841,204 | 1,289,856 | 374.3 | 115.3 | 120.3 |
| Rentals of offices and other real estate | 157,380 | 104,748 | 87,896 | 79.1 | 50.2 | 19.2 |
| Miscellaneous (1) | 306,982 | 101,298 | 80,504 | 281.3 | 203.0 | 25.8 |

(1) Includes also rentals of conduits and underground privileges and payments for telegraphic traffic made to other companies.

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## Operators Commended for Splendid Work Under Most Trying Conditions.

It is timely and simply a matter of justice to the operators of the New York Telephone Company to express the very high appreciation which the officials feel toward them as a body for the faithful and efficient service, judged by every standard, which they have been and are rendering to the public under circumstances more difficult and trying than have ever existed anywhere since the telephone was invented, says *The Telephone Review.*

The spirit of service which animates them is known to every subscriber and patron of the company who has lifted a receiver and placed an emergency call. The praises of the operator have been sung in prose and verse for a generation. The newspapers have been full of it, and the files of the company contain thousands of letters of appreciation—touching and pathetic some of them are—from men and women who say they cannot find words adequate to express their gratitude and deep sense of obligation for the patient, kindly and sympathetic service which these girls, perfect strangers to them, have shown in the most delicate and courteous manner in times of stress.

Business and professional men, from one end of the country to the other, rely on our girls as dependable assistants in their most important transactions, and everyone who has had experience with telephone service in other countries declares there is no service to be had anywhere in the world that will compare with the ordinary everyday service that our telephone girls are giving.

The praise that they have received is not exceeded by that bestowed upon women who devote their lives to the merciful work of the Red Cross, and instances will readily occur to our readers of telephone operators risking life itself in the performance of duty as bravely and unselfishly as any hero on a battlefield.

They need no defense or apology if they now find difficulty in coping with the deluge of calls, double and treble the amount of traffic they have ordinarily been called upon to handle, and if in consequence the service is not maintained at the same high standard that the public is accustomed to receive from them.

Wrong number connections, due to errors on the part of the public, and "line busy" and "don't answer" reports increase in number as the result of the increased traffic over the wires, just the same as any errors that the operators may make, and instead of criticism and complaint, the operating force of the company is entitled to receive the highest commendation for the public service that is being given under these conditions.

It is today of as high a grade as any service the public is receiving. Merchants have discontinued or reduced their deliveries; transportation lines have been forced to cut down the service they have been giving; newspapers have increased their price, limited their circulation and refused to take back unsold copies; on every hand, from coal to gasoline, costs have increased to the consumer, service has been reduced in one way or another, and the public has accepted it all with an explanation or none, as being necessary on account of the war.

And yet no business has been so much affected by the war as the telephone.

Instead of its traffic being cut down, it has jumped—by leaps and bounds. Instead of being relieved by the aid of any other means of communication, it has largely supplanted all others for personal, direct and immediate service. Instead of a reserve plant which could be utilized for growth, it is now next to impossible to obtain switchboards, copper wire, instruments and other equipment, so great is the demand to supply government needs both in this country and in France. Instead of being able to maintain a reserve force of highly trained and skilled operators, prepared to meet any demand, hundreds have been sent to Washington and into other government service.

Upon the heels of these conditions has come the epidemic of influenza, which has not spared the telephone operators any more than the rest of the population. More than this, the spread of the epidemic has still further increased the number of telephone calls which the operating forces on duty have had to handle.

In view of these facts and when it is remembered that by order of the government, government calls have precedence over all commercial telephone traffic, it will plainly be seen that the telephone operators are working under circumstances more difficult and trying than have ever existed anywhere since the telephone was invented.

The dependence placed upon the telephone is the greatest possible tribute to its utility, and such criticism as is directed against the present service is the highest compliment that could be paid to the operators for the service they have rendered in the past.

All of us must remember that present conditions are only temporary, and we must realize also that our work during these abnormal and extraordinary times is the form which "doing our bit" takes.

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## From the Electrical Age, New York, July, 1891.

Assistant Manager (to new applicant): "How long have you been in the business?"

Applicant: "Ich bin ein telegraphist twenty jahren."

"That so. Ever work a heavy wire?"

"Ich have den firsten Chicago ten jahren gearbeitet."

"Oh, yes, well, were you ever on what is known as the 'block'?"

"Nein, war niehmal auf der strasse."

"Are you in the habit of laying off payday?"

"Ich du neimals ablegen."

"All right, we may need you in case we have war with Germany."

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The Signal Corps officer who took King Albert of Belgium for an aeroplane trip above the fighting front in France was quite correct in addressing the King as "Your Highness."

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# CURRENT EVENTS

## Executive Office Announcements, Personal Mention, Appointments

### PERSONAL.

#### Holiday Greetings.

To our hundreds of friends and well wishers who sent us cards of greetings during the holiday season, TELEGRAPH AND TELEPHONE AGE extends hearty thanks and our wish is that the new year now starting will bring to telegraph, telephone and radio men everywhere a large measure of happiness and success.

C. R. H. ARNTZEMUS and E. R. HERSLING, engineers of the Netherland Telegraph Administration, and L. W. VELU, representative of the Western Electric Company in Holland, with headquarters at the Hague, are in New York, looking into telegraph and telephone affairs for the benefit of their country.

ASHBEL GREEN, connected with the administration of the New York Stock Exchange since 1914, is a telegrapher of long experience, having entered the service of the West Shore Railroad in the year 1891, subsequently advancing to the positions of chief clerk to the general manager and as trainmaster for the West Shore Railroad. Later Mr. Green entered the service of the American Telephone and Telegraph Company as district wire chief at New York. During the period of the war Mr. Green has been attached to the New York office of the naval intelligence service with the rank of lieutenant U. S. N. R. F.

J. B. BATES, who has been elected county attorney of Weber County, Utah, has for some time been a telegrapher in the service of the Associated Press.

THOMAS S. BRICKHOUSE, winner of the Carnegie diamond medal at the San Francisco telegraph tournament in August, 1915, is now a member of the telegraph staff of Clement Curtis and Company, Chicago.

JOHN R. SCOTT, an experienced telegrapher, prominent in the South, is located at Greenville, Miss., where he is manager of the Greenville cotton exchange.

WILL MACMAHON has been appointed day west wire editor of the Associated Press in the New York office, succeeding Frank W. Spencer, deceased.

The Associated Press now serves 1,135 newspapers with telegraphic news; the total includes sixty-two papers added during the year 1918.

### POSTAL TELEGRAPH-CABLE COMPANY.

EXECUTIVE OFFICES.

In accordance with the recent order of Postmaster General Burleson, Charles P. Bruch, vice-president and assistant general manager, has been placed in charge of operations.

WILLIAM HEARN, superinendent at San Francisco, is in charge of operations in the Pacific Division in place of A. B. Richards, general superintendent, recently removed by order of the Postmaster General.

H. C. BUNTING, until recently employed as chief operator in the Seattle, Wash., office of the Postal Telegraph-Cable Company, is now owner of a machine shop in which expert mechanical work is done. Mr. Bunting is well known in telegraph circles in the East as well as the West. Fifteen years ago he was electrical assistant to Stephen D. Field in the work of increasing the traffic carrying capacity of the Cuban cables.

W. B. SCHREIBER, a veteran signal corps telegrapher, and who served with the American forces on the Mexican border, is now manager of the Postal Telegrah-Cable Company's office at 20 West 45th Street, New York. Mr. Schreiber is a Master Signal Electrician in the New York Guard.

### WESTERN UNION TELEGRAPH CO.

EXECUTIVE OFFICES.

NEWCOMB CARLTON, president, sailed for Europe on the Cunard liner Mauretania on January 4. Mr. Carlton recently was appointed to direct the operation of the government controlled cable systems and his trip abroad is no doubt in connection with cable affairs.

FRANCIS R. STARK, assistant general attorney, has been appointed general attorney, vice A. T. Benedict, who becomes counsel.

THE COMMITTEE ON EDUCATION having charge of education of employees consists of Lewis McKisick, assistant to the president, chairman; Horace B. McChesney, representing the traffic department; Paul J. Howe, representing the plant and engineering department; W. A. Sawyer, representing the commercial department; and Lester Roth, representing the accounting department.

L. B. THOMPSON, division supervisor of equipment at Atlanta, Ga., is in New York for a week on business.

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THE AMERICAN DISTRICT TELEGRAPH COMPANY of New York has sold its physical property, consisting of call circuits, boxes and messenger service, to the Western Union Telegraph Company.

L. R. WHEELER, of the engineering department, New York, has gone to the cable station at Hearts Content, Newfoundland, in connection with cable operation.

WILLIAM V. MCGUINNESS has returned to his position as engineering assistant in the office of the central office engineer (plant department). Mr. McGuinness resigned on August 1, 1918, to join the United States Navy, aviation detachment. He received his preliminary training at the Massachusetts Institute of Technology, Cambridge, Mass. He was discharged by the government after the signing of the armistice.

ERNEST HUEBNER has been added to the force of the central office engineer. Mr. Huebner was formerly with the service bureau at 24 Walker Street and resigned July 30, 1918, to enter the employ of the government where he received a commission as lieutenant in the coast artillery corps. He was released by the government in December, 1918.

THE STENOGRAPHIC BUREAU of the plant department, in charge of Miss Louise F. Ammarell, gave a Christmas party on December 24, last. From the accounts of those present, the occasion was a most enjoyable one. Refreshments were served in the afternoon.

THE CABLE OFFICE at 16 Broad Street, New York, will be removed to the new building to be erected on the premises 38-40 Broad Street. The old buildings on the site are now being razed preparatory to commencing work on the new structure.

LIEUTENANT J. K. HARPER, formerly chief operator at New Orleans, but now located in Washington, was a New York visitor over the holidays. Lieutenant Harper is connected with the production and inspection division of the United States Signal Corps.

W. T. JONES, superintendent of the Bay Roberts, Newfoundland station of the Western Union Cable System, writes us that he "should be sorry to miss a number of TELEGRAPH AND TELEPHONE AGE."

## New York Western Union.

The arrival has been announced, on December 28, 1918, of Thomas Riddick (eight pounds), son of James V. Riddick of the marine department, general operating room.

H. G. PRESTON, formerly of this office, now with the Y. M. C .A., and attached to the 54th Regiment, American Expeditionary Forces in France, in a letter states that he wishes to be remembered to all his old telegraph associates.

A. M. GUEST, aged sixty-four years, one of the oldest members in point of service in the general operating department, died of pneumonia January 2. He was born in Baltimore, Md., and joined the New York staff in 1880, with which he was identified until the time of his death.

EDWIN A. CASPER has returned to his former position in the office of the division traffic superintendent. Mr. Casper had been in the Signal Corps training camp, passed the examination required and was commissioned second lieutenant. His brother, John W. Casper, arrived from France January 1, where he had been attached to the Signal Corps service for the past year.

F. MILLER is now located in the main operating room, where he is a member of the Multiplex printer staff.

CHIEF YEOMAN JOSEPH A. MURRAY died in the Navy Hospital, Brooklyn Navy Yard, December 28, 1918, of heart trouble, and was buried on January 2 with military honors. Prior to the war Mr. Murray was a receiving clerk in the 16 Broad Street office.

J. F. DACEY, an operator in this office for the past five years, in charge of the Louisville circuit, died on December 7 after a lingering illness. He was formerly employed in the Postal Office in this city.

G. W. HAMMELL, chief operator of the Augusta, Ga., office, was a New York visitor during the Christmas holidays.

## Washington, D. C., Western Union.

SAMUEL B. LAMBDIN, aged sixty-six years, formerly and for many years identified with the New York staff of this company, died in Brooklyn, December 23. Interment was at Alexandria, Va. Mr. Lambdin was somewhat of an artist, being a collector of all sorts of curios. He had written a considerable amount of poetry which he got out in book form. He left the telegraph service about fifteen years ago.

ROBERT LITTELL, an old time operator, who left Washington a month ago, died in New York, December 24. The remains were buried at Bound Brook, N. J.

POSTMASTER GENERAL A. S. BURLESON made an inspection of the main office in Washington, January 4.

## T. M. Haston Promoted.

As announced in the January 1 issue of TELEGRAPH AND TELEPHONE AGE, Thomas M. Haston has been appointed division traffic supervisor of the Western Union Telegraph Company, with headquarters at Washington, D. C.

Mr. Haston was born in Newman, Kan., July 14, 1872, and entered the telegraph service as messenger at Abilene, Kan., when fifteen years of age. In the following years Mr. Haston was employed as operator, wire chief, train dispatcher and as relay

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office manager on the Union Pacific, and Chicago, Burlington and Quincy Railway systems, and in the service of the Western Union Telegraph Company as chief operator.

His service with the Burlington Railway was from March, 1900, until November 1, 1909, on which date he became superintendent of telegraph of the Toledo, St. Louis and Southwestern, and Chicago and Alton Railroads, with offices at Bloomington, Ill.

After resigning from railroad service Mr. Haston re-entered the employ of the Western Union Telegraph Company at Chicago, and his recent advancement is a recognition of his ability and his long experience in handling telegraph traffic.

## THE CABLE.

LEONARD C. SCHELD, an employee of the executive offices, Commercial Cable Company, New York, and who has been serving in the United States Army at Camp Dix, has suffered the loss of his wife, who died of pneumonia on December 24.

D. MACDONALD, well known cable and land line telegrapher, is a memebr of the Commercial Cable Company's staff in the main office at 20 Broad Street, New York.

### Cable Staff Changes.

In the service of the Eastern Extension Telegraph Company the following staff changes have taken place: To Singapore, H. S. Leggatt, W. E. Adams, Dr. Costello, J. Ince, W. A. Blackford, R. J. Marshall, J. T. Ryder, B. Storey, A. C. W. Pooley and J. Winterbottom; to Cape St. James, P. Croft and J. B. Wishart; to Darwin, C. E. Docker; to Banjoewangie, H. Thomas and W. M. Black; to Cocos, F. C. Pepper, D. R. Longson, C. H. Wookey, F. B. Eddington, A. R. E. Young, A. G. Lee, E. J. Smart and J. K. Inge; to Hong Kong, A. E. Spriggs.

### Cable Traffic Restrictions Removed.

Effective January 1, 1918, any person or firm in the United States or its possessions who does not already possess a registered cable address will be permitted to register one such address with the telegraph and cable companies for use in cablegrams addressed to the registrant, effective the same date. Restrictions on the use of cable addresses registered since July 1, 1914, and prohibition of the use of cable addresses registered since January 1, 1917, are removed.

All registered addresses irrespective of the date of registration may be used in cablegrams from countries with which the use of registered address is permitted.

### Brazil Revokes German Cable Concession.

By decree of September 6, 1918, the President of Brazil declared null and void the concession granted in July, 1908, to Felten and Guillaume-Lahmeyerwerke Actien Gesellschaft, of Mulheim on the Rhine, and later transferred to the Deutsch-Sudamerikanische Telegraphengesellschaft A. G. to establish and operate, without monopoly, an ocean telegraph cable between a point on the coast of Brazil and the Island of Teneriffe.

## THE TELEPHONE.

WALTER S. GIFFORD, until recently director of the council of national defense, has been appointed comptroller of the American Telephone and Telegraph Company, succeeding Charles G. DuBois. Mr. Gifford was formerly chief statistician of the American Telephone and Telegraph Company and was loaned by that company, at the request of Secretary Baker, to assist in the organization of the council of national defense.

E. R. PHILLIPS has been appointed division auditor of receipts of the Chesapeake and Potomac Telephone Company, at Richmond, Va.

THE PACIFIC TELEPHONE AND TELEGRAPH COMPANY, on November 1, 1918, had a total of 656,330 stations in service, a gain of 15,516 stations since January 1, 1918, or 2.42 per cent. The greatest station gain was at San Diego, Cal., with an increase of 5.049 stations, the November 1 total being 20,938 stations. The greatest loss in the number of stations was at Los Angeles where the total dropped from 132,622 to 122,122 stations between January 1 and November 1, 1918.

### Number of Telephones in Latin American Countries on January 1, 1917.

| | |
|---|---|
| Argentine Republic | 92,785 |
| Brazil | 50,204 |
| Mexico | 39,914 |
| Cuba | 23,970 |
| Chile | 21,016 |
| Uruguay | 16,860 |
| Venezuela | 6,775 |
| Peru | 5,628 |
| Colombia | 5,070 |
| Panama | 4,184 |
| Ecuador | 3,365 |
| Bolivia | 2,747 |
| Salvador | 1,905 |
| Guatemala | 1,890 |
| Costa Rica | 1,423 |
| Dominican Republic | 1,317 |
| Honduras | 783 |
| Nicaragua | 650 |
| Paraguay | 499 |
| Haiti | 82 |
| Total | 281,067 |

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# The Progress of Government Control of Telegraphs and Telephones.

On July 13, 1918, the United States Senate passed a joint resolution, previously passed by the House, authorizing the President to take over and operate telegraph, telephone, and cables, and radio stations for the period of the war, effective July 31, 1918.

On November 16, 1918, the Postmaster General took over the control and operation of submarine cables.

On November 22, 1918, the Postmaster General called upon Theodore N. Vail, president of the American Telephone and Telegraph Company for suggestions in wire service problems.

At the end of this report is given a complete list of all committees so far announced, covering the government's plans to control and operate telegraph, telephone and cable lines.

Since the January 1 issue of TELEGRAPH AND TELEPHONE AGE, the following events have taken place:

The appointment on December 13 of an operating board consisting of Messrs. U. N. Bethell, F. A. Stevenson, G. M. Yorke and A. F. Adams, for the operation of the telegraph and telephone services under government control, called forth a statement in protest from the Mackay Company officials.

W. J. Deegan, secretary of the company, said:

"We cannot believe that it is the intention to interfere with the present separate operation of the Postal Telegraph Company's land-line system. If it does mean that, we shall have to contest it. There seems to be no lengths to which Mr. Burleson is not willing to go, and apparently the Bell Telephone and Western Union are quite willing to join with him in putting the Postal Company down and out.

"We have no representative on this committee, and were not requested to have a representative. If Mr. Burleson attempts to close any of our offices or run our wires into Western Union offices, or interfere with our business, the Public Service Commissions of the various states will have something to say about it. And then, too, there are criminal statutes in most of the states against interfering with telegraph lines, and, in fact, only a few weeks ago Congress itself passed such a criminal statute. We do not believe that the public will tolerate Mr. Burleson's wrecking the Postal Telegraph system, if that is his intention."

### STATEMENT OF T. N. VAIL.

Through the combination of all systems, Mr. Vail contends, an almost perfect system of electrical communication can be established throughout the United States. This will be, his letter says:

"One system, interdependent and interrelating, with a single or co-ordinated responsible control over all similar utilities and over all the factors that make for operation, for continuity, for permanence, for efficiency and success."

Special interest is attached by wire authorities to this letter of Mr. Vail's, since it is known that he had been frequently in conference with representatives of the government. It is believed by many that he, in his letter, is explaining what Mr. Burleson's course is to be.

The letter refers to House Bill 368, which is the government control measure. The letter follows, in part:

"Under the present status of government operation and control, little can be done toward the ultimate solution which must take place, which will not have to be undone when the period of control ends.

"There is, however, in my opinion, a possibility of a simple, complete and satisfactory solution."

### CHANCE FOR CONSTRUCTIVE WORK.

"There is without doubt an opportunity for a great piece of beneficial and constructive work by combining and co-ordinating all the various existing utility services, or those that are complementary and supplementary, into one or more well balanced systems, the extent of which should be determined by the nature of the service, by the extent of the service rendered, and by commercial, geographic, economic reasons; and by combining in a direct manner, and as far as possible divorced from political or partisan or class influence, the requisite power and authority of the Federal government expressed in a mandate to equilibrate revenue, operating costs and capital charges with an operating organization adapted to the requirements of the service and based on the methods which experience, enterprise and operation in the industrial world have shown to be effective, efficient and economical."

### MR. MACKAY'S REPLY.

Mr. Mackay issued a statement January 7, in which he opposed the views of Mr. Vail.

"This is a fetish of Mr. Vail's," said Mr. Mackay.

"He cannot get it into his head that the American people want competition in the telegraph at least. He combined the Western Union and Bell Telephone in 1909, and the government five years later tore them apart.

"We can find no evidence anywhere in the United States that the business man, manufacturer, banker, broker, merchant or any one else wants the Postal Company to combine with the Western Union, even though it be done by falling into the maw of the Bell Telephone.

### SAYS VAIL IS NOT FAIR.

"Mr. Vail is not fair in his statement of the facts. He says competition in the telegraph business has not been existent in the true sense of the word for years. What in the world does he call competition? If you ask the American public whether there has been competition they will tell you that there decidedly has been, and still is. Mr. Vail says that the

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only competition has been in the profitable business, at one-fifth of the telegraph offices, serving one-half of the population. He omits, to state that the competition by the Postal serves all cities in the United States where telegraphing is done.

"The farmer and the laboring man rarely use the telegraph; neither does the clerical class. Telegraphing is done by the manufacturer, banker, merchant and broker, and in fact four-fifths of the telegraph business is done in cities where the Postal Company gives competition. Mr. Vail carefully avoids mentioning that fact. He says that the Postal Company does not compete for unprofitable business. Why should it do so? If the Postal Company competed for unprofitable business both telegraph companies would lose money on that business."

LIST OF COMMITTEES SO FAR ANNOUNCED IN CONNECTION WITH GOVERNMENT CONTROL OF TELEGRAPHS AND TELEPHONES.

Committee for the governmental management, operation and control of telegraph and telephone systems: Postmaster General A. S. Burleson, chairman; John C. Koons, first assistant postmaster general; David J. Lewis, commissioner, United States Tariff Commission, and Wm. H. Lamar, solicitor for the post office department. Committee named July 23, 1918.

Committee to determine to what extent the branch telegraph offices can be consolidated or coordinated with branch postal stations, and to determine the feasibility of consolidation of the messenger service and the government's special delivery service: Carter B. Keene, director division of postal savings; Goodwin D. Ellsworth, superintendent division of post office service; M. C. Chance, postmaster at Washington; Henry F. Taff, general superintendent, Western Union Telegraph Company at Washington, and George M. Foote, manager, Postal Telegraph-Cable Company at Washington. Committee appointed August 7, 1918.

Committee to investigate and carry on negotiations for the unification and control of the various telephone companies operating in the same communities: N. C. Kingsbury, vice-president American Telephone and Telegraph Company, and George W. Robinson, president Tri-State Telegraph and Telephone Company. Committee appointed August 15, 1918.

Committee to investigate contracts with railroads: Joseph Stewart, special assistant to the attorney general; G. W. E. Atkins, vice-president of the Western Union Telegraph Company; John Barton Payne, counsel for the Railroad Administration; Henry Carter Adams of Michigan University, and David Friday of New York University. Committee appointed September 10, 1918.

Committee on standardization of telegraph rate schedules: David J. Lewis, chairman; John C. Willever, vice-president, Western Union Telegraph Company; Edward Reynolds, general manager, Postal Telegraph-Cable Company. Appointed September 10, 1918. On November 21, 1918, Charles C. Marshall, Ohio Public Utilities Commission and Joseph B. Eastman, Massachusetts Public Service Commission, were added to the committee.

Committee on standardization of telephone rate schedules: David J. Lewis, chairman; Harry B. Thayer, vice-president, American Telephone and Telegraph Company; Charles Y. McVey, president, Ohio Telephone Company. Appointed September 10, 1918. On November 21, Paul Haynes, Indiana Public Service Commission and Noah W. Simpson, Missouri Public Service Commission, were added to the committee.

Committee to investigate the working conditions of and wages paid to employees of the telegraph and telephone companies: William S. Ryan, assistant superintendent of the division of post office service; John B. Colpoys, special agent, Department of Labor; U. N. Bethell, first vice-president, American Telephone and Telegraph Company; F. B. MacKinnon, vice-president, United States Independent Telephone Association, and Miss Julia S. O'Connor, president, telephone operators' department, International Brotherhood of Electrical Workers. Committee appointed September 13, 1918.

Operating Board to make a complete survey of all land-line telegraph and telephone systems and parts thereof, to report to the Postmaster General from time to time as to what changes in the method of operation and in the personnel will result in increased efficiency and economies: U. N. Bethell, chairman; F. A. Stevenson, general superintendent of plant, American Telephone and Telegraph Company; G. M. Yorke, vice-president in charge of plant, Western Union Telegraph Company, and A. F. Adams, president of the Kansas City Home Telephone Company. Committee appointed December 13, 1918.

## Cable Seizure Legal Decision.

Suits through which the Commercial Cable Company and the Commercial Pacific Cable Company recently sought to induce the local Federal Court to enjoin the Government from operating the Mackay cable lines and to obtain their restoration to their owners were dismissed by Judge Learned Hand in the United States Court in New York on January 10, on the ground that the cause was not justiciable. The court held that Congress had properly delegated power to seize the cables to the President to aid him in his constitutional functions both as Commander in Chief of the military forces and as the initial power in treaty making, and that the question whether the President had acted wisely in using the power of seizure could not be determined by a court without "substituting a government of courts for a government of laws."

The old wire chief says: "The telegrapher who does not take enough interest in his profession to read its literature is in a fair way to remain in ignorance of his part in the scheme of things."

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# EDUCATIONAL.

**In the preparation of the following articles on telephony and radio telegraphy, authoritative works have been drawn on for the substance. The questions at the end of each department are made up independently of the works consulted and are prepared to enable the student to review the lessons. Books from which material is taken are "Radio Telegraphy," a publication by the United States Signal Corps, aud "Modern American Telephony." The articles on telegraphy are prepared by the editorial staff.**

## Telegraphy.

### RULES FOR MAGNET WINDINGS.

Many formulæ have been devised by means of which it is possible to determine the number of feet and size of wire to be wound upon an iron core of given dimensions in order to produce a given magnetic effect.

When the student finds in the books and technical papers that come to his hands different formulæ covering the same operation, it is well for him to remember that all of these formulæ are perhaps correct, but it is not necessary for him to memorize all of them or even to record them in his memorada book. The successful practical man usually masters one good formula covering each requirement of engineering.

One formula for determining the number of turns of wire that may be wound upon a given core is:

$$\text{Turns} = \frac{L\ (D - d)}{2\ G^2}$$

Where L = length of the winding in inches,
d = diameter of the core in inches,
D = diameter of the winding in inches,
G = diameter of one strand of the wire including the insulation.

A more general formula and one which will be found to meet a wider range of conditions is known as the Gibson formula.

If we assume a current density of 1,000 amperes per square inch, the carrying capacity of a circular mil is 0.0007855 amperes. The resistance of a mil-foot of copper wire at 75 degrees F. is 10.51 ohms. Hence, if E is the voltage of the circuit to which the winding is to be attached,

$$0.0007855 = \frac{E}{L \times 10.51} \text{ or } L = 121 \times E$$

where L is the length of the magnet wire in feet. If the estimated length of a mean turn about the magnet core is t, the number of turns will be $\frac{L}{t} = N$; and if the necessary number of ampere turns is M, the current the wire must carry will be $\frac{M}{N}$. The circular mils necessary to carry one ampere at 1,000 amperes per square inch are 1,273; therefore, the cross section of the wire in circular mils is $1{,}273 \frac{M}{N} = 10.5 \frac{Mt}{E}$, and the number of the wire may easily be found in the tables. These formulæ, length of wire = 121 E feet and size of wire $= 10.5 \frac{Mt}{E}$ mils, are much more convenient to apply than the formulæ usually given.

*(To be continued.)*

### TELEGRAPH EXAMINATION QUESTIONS.

40. Draw a sketch of an open and a closed pinjack in series with a grounded battery.
41. Draw a sketch of a metallic circuit including a cell of battery and an open circuit pinjack connected in multiple.
42. What is meant by the constant of a galvanometer?
43. Describe the principles of a differential relay or galvanometer.
44. What would be the resistance of a multiplier required to give a ten volt meter having a resistance of 1,000 ohms, a range of 100 volts?
45. What is the joint conductivity of three condensers connected in parallel, one having a capacity of two mf., one 1 mf., and the third a capacity of three mf.?
46. What would be the capacity (total) of three two mf. condensers connected in series?
47. What is the artificial line of a telegraph duplex, and what is its purpose?
48. What is a simplex circuit?
49. What is a composite circuit?
50. What are the various effects of sparking at contact points?

## Telephony.

### CORD CIRCUIT PRACTICE FOR MAGNETIC SWITCHBOARDS.

Although many are inclined to consider the telephone a comparatively recent invention, it must be remembered that its beginning dates back to a time when the entire science of applied electricity was new and in an extremely crude condition.

The modern principle of multiple or bridging connections of several pieces of apparatus on a single circuit having not yet been discovered and the connection of electrical instruments up to that time

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having been confined to the series scheme, it was but natural that this system was employed in the early installations.

The series arrangement for party line telephones proved a failure and was in time supplanted by the modern bridging system, on which principle not only telephones, but electric lights, street cars, motors, and other devices now in use are operated.

The fact that many exchanges have failed to give first class service, due to this difficulty, makes it advisable to clear our minds as to just what caused the trouble. The first switchboards designed, being for lines equipped with series telephones, were provided with series ring-off drops. These early boards were all of the single conductor type for use with the grounded or common return lines of early systems.

In their practical operation the modern bridging system and the earlier series system are exactly opposite, and but very little apparatus planned for use with one will operate satisfactorily with the other. Thus it is well known that series and bridging telephones will not operate successfully on the same line. But a principle almost as important is the fact that series telephones should not be used in the same exchange with bridging telephone, and the ordinary type of switchboard employing a single bridging ring-off drop to each cord circuit.

With the series arrangement both parties had to talk through the ring-off drop. This is now known to be bad practice and seriously interferes with long distance talking. The reliable ring-off feature of the series switchboard was not lacking in case of the connection of two series party lines with each other, or in the case of the connection of a series party line to a party line having but one series telephone. In either of these cases, on the operation of the generator at any telephone on either of the two connected lines, all current produced passed through the central office ring-off drop, and under any circumstances one was almost assured of attracting the attention of central with one ring.

But the series arrangement of any great number of telephones on one line having proved a failure, on account of poor talking, necessity proved, as usual, "the mother of invention," and soon, for party line service, the bridging telephone with its high wound ringer was introduced in practically the form in which we have it to-day.

The first thing discovered in connection with 1,000, 1,600 and 2,000 ohm ringers was that they could not be used on a line with the series ring-off drop boards at first in use.

*(To be continued.)*

QUESTIONS IN TELEPHONY.

What is meant by the series connection of telephones?

What is meant by the multiple connection of telephones?

Do "multiple" and "bridging" mean the same thing?

Is it practicable to connect series and multiple telephones on the same line?

## Radio Telegraphy.

RECEIVING CONNECTIONS FOR CODE RECEIVING.

In the January 1 installment of this series of articles was explained what is meant by coding of wave lengths in radio telegraphy, and in what follows the connections and operation of the code receiving set are described.

One lead from the aerial is connected through a combination switch to the primary of the receiving transformer, and from there to a plug contact making connection with a small switch marked "Long Waves–Short Waves." If the switch is thrown to the long wave side, the aerial circuit connects directly to the earth through a condenser, thus placing the aerial and condenser circuit in parallel with the primary of the receiving transformer.

The secondary or detector circuit consists of the secondary of the transformer in series with the usual stopping condenser connected through the main switch to the detectors. The telephones are in shunt with the stopping condenser.

The detector used is of the iron pyrites type, somewhat less sensitive than the perikon detector, but any type of detector may be employed as desired.

With the switch thrown to the long wave position the best results are obtained with small condenser capacity and with a large amount of primary inductance, and when the switch is thrown to the short wave position the best results are obtained with these factors reversed.

The switch used to connect the receiving set into the antenna circuit performs several operations: opening the switch disconnects the receiving set from the antenna and earth contact or counterpoise; automatically connects the sending set to the aerial and earth; closes the direct current circuit of the generator; disconnects the detector from the secondary of receiving transformer, thereby opening that circuit and preventing detector from being affected by the sending spark, and also opens the primary circuit of the receiving transformer. As the limits of the various coils of the primary and secondary are marked, the adjustments for wave length may quickly be made. When adjustment is made for the wave length being sent out by the distant station, the operator at the receiving station then varies the capacity of his aerial condenser and also the coupling between the primary and secondary of the receiving transformer until maximum strength of signals is heard in the telephones. Changing the coupling by pulling the secondary away from or moving it closer to the primary coil, changes the wave length adjustment of the receiving set, but not to the same extent as does changing the capacity of the condenser.

The foregoing presents principles of radio receiver adjustment which should be studied carefully.

*(To be continued.)*

## Shop Talk.

BY THE OBSERVER.

Perhaps some will say that I took the wrong meaning of the prospectus alluded to in the previous

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article; that it meant those who felt that they were as "high up" as they could really expect to go would waste their time by enrolling. Surely none of us want to feel that our hopes of success are over and that we have no further aspirations. Now, the only ones who are engaged in the electrical departments of the telegraph companies that are excused from the intellectual treat I mentioned, are those whose education far exceeds the course in question. I know they are in the minority, and I also know there are many men past forty-five engaged in the pursuits in question, and many of the same ages, that want to enroll, and feel that they are past the age of admission. Wake up! Enroll at once, and as soon as you make headway in your studies, ask for a chance to show your ability, and the rest is a matter of just so much work, and it will prove a "survival of the fittest." Now many of the students that enroll in this and similar courses are so eager to get into the electrical papers that they go in a sort of a hop, skip, and jump method over the mathematical papers that must precede the electrical. Many of the students, instead of studying carefully their mathematics, procure the aid of some friend to work those problems, and then wonder why they do not understand the electrical papers better. I might say that mathematics is the foundation of the electrical house. Such being the case, just picture to yourself what would happen were one to try to build a large house on a flimsy foundation. Never ask any one to help you in your studies until you have done your utmost. Now I do not mean that you should spend sleepless nights, or torturous days worrying over the problems, but if, after several hours, you cannot successfully solve them, lay the work aside until the next session, several hours, or the next day, and with a clear mind tackle it anew, and if you cannot master it, then call for help and pay strict attention to what is shown you, so that you may realize why you failed. By doing this you will get the full benefit of your course. It has been said that some of the greatest lessons we learn are due to our mistakes; therefore, do not feel disconsolate because you are unable to master any particular problem. I dare say there are many problems throughout text books that even the professor cannot work, or let us palliate this charge and say that he cannot master without the exercise of "gray matter." This is a truth and, such being the case, is it any wonder that you will find many stumbling blocks while you are plodding on your way? Never avoid a problem in your course because it seems too difficult, or because you cannot at that time see any good reason for such to appear, for it may be the pivotal centre upon which some of the electrical laws are operative.

*(To be continued.)*

## Telegraph and Telephone Life Insurance Association Annual Meeting.

The annual meeting of the Telegraph and Telephone Life Insurance Association will be held at 195 Broadway, New York, on Wednesday, March 12, 1919, at 4 P. M.

## AMERICAN TELEGRAPHERS IN FRANCE.

### J. P. Wilson the Ace of Operators.

Now that the war is practically at an end we are beginning to receive interesting reports of the part American telegraphers played in demonstrating American resourcefulness in handling large and intricate undertakings.

The perfected telegraph system organized by the United States Signal Corps was in full swing by August 19, 1917. Since that time our telegraph men have handled over six millions of messages, aggregating more than one-third of a billion words.

Many well known American operators have been identified with this great work; operators from the Western Union and Postal services, and from the service of the Associated Press were on duty at all important posts.

Sergeant Ben Yon, formerly in the New York office of the Associated Press, is in charge of the base signal office at Tours, and several Associated Press "stars" also are attached to that office.

When the corps of newspaper correspondents was moved up to the front lines with the beginning of the American action in the Argonne, certain wires were turned over for their use and one day there walked in Corporal J. P. Wilson, who was long stationed at Salt Lake City and other western divisions of the Associated Press. He brought his side sender, or "bug," in operator's parlance, quietly cut it in on a table in the French telegraph office, and began business. The second night, when the French operators had watched copy melt in Phillips' code to a receiver of equal training they exclaimed: "He is the ace of operators!"

RAILROAD OPERATORS CITED IN GENERAL ORDERS.

Major General J. L. Hines, commanding the third army corps, A. E. F., France, in general orders No. 50 mentions Corporal Adna Filson, Company B, 308 field signal battalion, as "Displaying a fine spirit of self sacrifice in having rendered invaluable service at a most critical period, by keeping, on October 23, 1918, vitally important and heavily shelled telegraph and telephone lines in constant repair."

Before joining the Signal Corps, Corporal Filson was a telegraph inspector on the Big Four Railroad.

## Legal Decision Covering Joint Operation of Telegraph and Telephone Services.

The transmission of telephone messages is included in the "telegraph business," so that a telegraph company, to use its wires for telephone messages, requiring only additional appliances in buildings for telegraphing, merely extends its service, and need not obtain the certificate of public convenience and necessity, provided by the Illinois public utilities act, § 55, for construction of new plant, equipment, property, or facility.—Chicago Telephone Company vs. Postal Telegraph-Cable Company; Supreme Court of Illinois; 120 Northwestern, 795.

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## Catching a Wire Thief.

BY ROBERT ELLIS.

The public in general realizes that the wire using companies each winter suffer heavily on account of the prostration of their lines due to storms, but it is only those connected with the Plant Department who know that another element is also considered in their losses—the wire thefts. The loss from this source alone is quite large ever since the several companies adopted copper as a medium of conductivity. Even with rigid vigil on the part of the companies, ably assisted by the police departments throughout the country, the wire steals are still going on despite all precautions. As a rule these thefts are committed by ex-linemen who for various causes were discharged from the service.

The writer was at one time a lineman under Foreman Martin J. Sullivan, now deceased, and our gang was engaged in reconstructing the Putnam Branch of the New York Central Railroad from High Bridge to Brewster. It was a bitter cold winter, and while punching frost with the heavy steel bar, very hard work as all groundmen know, I was longing for a soft job down at 195, pushing a pen. At Elmsford about 12 o'clock one day, Foreman Sullivan accosted me while I was engaged in my strenuous task and asked me to report to the Wire Chief at No. 195 Broadway for orders. I arrived some time in the afternoon and was elated when assigned to the perilous job of tracking down wire thieves. Frequent steals were getting on the nerves of the officers of the company, and it was a fact that nearly every week a gang or two were sent out of New York to restore wire breaks caused by thieves along that particular road and it was invariably our gang that had this job. My instructions were to get on the ground and remain secreted in the woods south of Lincoln station. This was where most of the thefts had occurred. It was to be an all night vigil and if I heard the twang of the coppers after they were cut, I was to know the gang was at work. After their work was completed I was to follow them in the dark at a discreet distance, of course, until they entered some neighborhood where police assistance was available and I could give them up. Knowing that I would need assistance, the wire chief assigned a man to help me. We made arrangements to meet at midnight near Van Cortland Park and walk over to Lincoln station, a distance of about a mile. I left home that evening pretty well fortified. Having met as arranged, we traveled through the dark night to our rendezvous near the Lincoln station. We did not go directly to the station, but veered off to the left into the woods so as to avoid the wire thieves, who might be on watch at the station for police interruption. It was about one o'clock in the morning when we reached there, and it was a very dark night. The path, under these circumstances, through the tangled underbrush was very difficult, and as my partner was over seventy years old, I had to assist him over the bad spots, and after falling several times into deep depressions, we finally hit the tracks about 300 feet south of the station. Observing nothing alarming, we crossed over to the other side and were in the wood in a very few seconds. I instructed my partner to hide behind one of the trees, while I selected another hiding place. There we remained the entire night conversing in low tones, expecting every minute to hear the snapping of the wires in front of us, but nothing happened. We were glad, however, to see daylight approaching, for our hiding place was a veritable swamp and our feet were soaking wet. We both vowed after that night to call it quits and let regular detectives do such stunts. The next morning I arrived at 195, and tendered my resignation; my friend did the same. The following day I went back to my regular work in the gang, digging holes in frost, and later they assigned another man to patrol this section in daylight without result. The steals continued. It was some few weeks later when I was given an opportunity to become a hero the second time, and I made good. I bagged a wire thief. We were working north of Dunwoodie station restoring the wires, which had been stolen from the poles the night before, and the particular job I was at was trimming trees. While climbing a little higher up the timber for further cutting, I was surprised to hear someone from the ground holler for me to come down. It was the foreman and he was in the company of a fox hunter of reputation in that vicinity. They asked me to go along with them. We went up the tracks for a short distance and crossed over into the wood.

After climbing the right-of-way fence, we ascended a steep hill, a part of what is known as Storm King Mountain. I was in the dark as to the nature of the errand, but my doubts were dispelled in a few minutes. When approaching a large tree we saw several heaps of copper wire coiled to take away. "This is why we brought you along, Bob," the foreman remarked. "There is no doubt that these thieves will appear pretty soon to haul away the stuff. Get in hiding somewhere; let them haul it away, and you follow and have them arrested. In the meantime we are going to Yonkers for police assistance."

Satisfying myself that there was no one in the immediate vicinity, I went behind an overhanging rock about 100 feet from the tree where the plunder was located.

As the foreman and fox hunter predicted, the spoils were to be removed that morning, for about 11 o'clock I perceived coming down the mountain path the culprit himself, an unusually large man, so it seemed to me. This path led from the road which topped the mountain at this particular point where the wire was hid. He was carrying a large suit case. He approached cautiously to the tree, first scanning his surroundings to see if he was being watched. Not realizing that someone was near, he came to the wire and laid down his cavernous satchel. Scenting trouble, he approached my hiding place, but he stopped by a tree next to it, and satisfying himself still further he opened the bag and carefully packed what wire he could in it. As he could not put it all in, he slung two or three

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small coils on his shoulder. He was unable to close the bag, so he took one of his shoe laces and tied up the bag in that manner. After giving another look around he started up the path with his coppery haul. I let him go about 100 feet, when I myself heard a crackling of the bushes in my rear, and through an opening in the wood I saw that it was my foreman and the fox hunter with another man accompanying them. With these reinforcements in sight I gave chase to the thief, calling on him to surrender. He paid no heed, but kept on running. Instead of continuing up the path that led to the top of the mountain, he diverged to the right, paralleling the track, and shortly threw away his loot. He gained ground somewhat by this and I lost him, but for some reason in a few seconds he crossed my path and I was able to close in on him. Outdistancing my allies, I was afraid just then to grapple with him alone, but fortune helped me out at this juncture, for the thief flung himself blindly into a barbed wire fence. Before he could disengage himself I flung myself upon him and held him there, my prisoner. In the meantime the Yonkers detective emerged from the thicket and held a revolver to the thief's head, calling on him to raise his hands. He complied promptly and was thoroughly searched by the officer, but no weapons were found on him. While the detective held the prisoner, the foreman and myself returned to the woods and brought the wire along as evidence. We hired a vehicle at Nepperham Station and brought both wire and prisoner to Yonkers police station. He was put through the third degree, but would not admit that any one was implicated with him in the wire steals on the Putnam Branch.

A few days later he was remanded for the Grand Jury at White Plains, N. Y., and later I was called there to give evidence at the trial. He was sentenced to one year in jail, but while there he contracted smallpox and was sent to a Brooklyn hospital. He was there but a few days when he escaped, and this was the last time we ever heard of this particular wire thief.

## Electrical Fun.

Electrical experimenters who possess induction coils of any type, or who have access to primary batteries and to the ordinary tools and pieces of apparatus found in the amateur's garret, will find a great fund of information in the book Electrical Experiments, by G. E. Bonney.

Many mysterious and interesting electrical experiments are explained and instruction given for their performance. A few of the 144 illustrations are: Testing the sphere of magnetic influence, diamagnetic experiment with candle, apparatus for producing sparks under water, negative and positive dust figures, apparatus for decomposing water, experiments with the electrical egg, electrical chimes, glass or card piercer, the electric whirl, etc.

The price of the book is $1.35, and copies may be purchased from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

## The Buzzer as a Telegraph Receiving Instrument.

BY H. A. EMMONS.

[The following is from a paper read by Mr. Emmons at the convention of the Association of Railway Telegraph Superintendents, held in Chicago, December 5 and 6, 1918.]

I do not know who designed the first telegraph sounder, but its development undoubtedly came out of the fact that many of the early register operators were able to read their registers by sound.

The early wireless experimenters found that the Marconi coherer operating a sounder was a troublesome instrument and later inventors discovered that other forms of receiving devices used in conjunction with a telephone receiver were better adapted for the purpose. The dots and dashes being received as buzzes were found to be quite easily learned.

Our Morse school records show that it takes approximately 800 hours' code practice for the average learner to master American Morse sounder and obtain a proficiency of twenty-four or twenty-five words per minute sending and receiving.

Data taken from the performance of signal corps personnel at City College, New York, where large numbers of buzzer and radio operators have been trained for the army, shows that about 300 hours' code practice is required to give the learners a proficiency of twenty-four or twenty-five words per minute in sending and receiving using international Morse and receiving on the buzzer or its equivalent, the head telephone receiver.

My attention was first directed to this remarkable difference in time to learn the buzzer versus the sounder some years ago when observing the ease with which radio amateurs learned to read from their radio sets. At the time I attributed this facility to intense interest in their hobby, but subsequent analysis showed that the real reason is probably the inherent difficulty of doing things negatively, that is, doing something when nothing happens. In reading the sounder lever one reads the time interval between the down stroke click and the up stroke click. In reading international Morse from the buzzer, one reads a short or long sound or note. This difference is vital to the learner. In the sounder method it takes him more than twice as long to reach a proficiency of reading twenty-four or twenty-five words per minute as it does with the buzzer. This same space interval trouble occurs in the American Morse letters O, R, C, Y, Z and the character &. Not only do beginners have difficulty in learning, but experienced operators make errors due to these space interval letters.

It is generally assumed that the international Morse is slower than American Morse, i. e., that an operator working with it cannot do as much work as can an operator working with American Morse. Theoretically, international Morse when used on the Wheatstone system is slower than American Morse, but when hand working is considered it is doubtful whether there is any appreciable difference when the operators have the same

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dexterity and the short figures of the international Morse are used.

Slowing down for spaced letter groups, repetitions by the sender of spaced letter groups, breaks by the receiver, and stumbles by the sender using American Morse offset to a great extent if not entirely the theoretical difference in favor of American Morse.

One of the most noticeable things about buzzer reception is that men over twenty-five and thirty years of age appear to have but little difficulty in learning to read the buzzer. We all know how difficult it is for most people over twenty-five to learn to read the sounder with ease. This fact should be of interest to you railroad men, who during each year, have a number of arm and leg casualties among the train men which prevent them from returning to train work. Their knowledge of train operation and railroad practices should be of great value to the road and if it were the policy of the road many of them could undoubtedly be trained for telegraph positions, in a relatively short time.

We have all been put to our best efforts during the war to provide an adequate operating staff. We all know how well or badly we succeeded. It seems to me now that the war is over and readjustments are coming that we should make our plans so broad that our companies will not only be able to do their part in the rehabilitating of the returning men, but also place themselves in a position where the operating staff may be expanded expeditiously and economically wherever necessary.

There are many details of equipment to be worked out to make a change of this kind. Preliminary consideration of the problem however, indicates that the needs of the service can be fully met without undue expense. It may be found that while a heavier capital expense for apparatus may be required that the total charges will be less.

## Reducing Line Voltage Increases Current.

A wire chief writes us as follows: "On a recent occasion we had a badly escaped wire between New York and Washington. Using a 240 volt duplex Washington received from New York a current of five milliamperes, which rendered the circuit inoperative. A change was made to a line potential of 160 volts, using the same wire and the same duplex sets, and immediately the current received increased to fifteen milliamperes, permitting of operation in both directions."

The writer of the letter advances a theory in explanation of this apparent paradox, and his theory is, very likely, the correct one. It is to the effect that a main line wire may at a given time be in such a state of insulation relatively to the earth that a strong battery will act to reduce the insulation existing at one or a number of points, thereby permitting the escape of a larger proportion of the current than is the case when the line battery is of a lower potential.

When the lower potential is applied and it is found that the current at the distant station increases in strength it is due to the fact that the potential is not high enough to break down the insulation at the weak spots and thus a greater proportion of the sending current reaches the distant station as received current.

The effect, of course, is just the reverse of what should take place when an increased battery strength is applied to a line, and where a line is maintained in a good state of insulation increasing the battery strength increases the strength of both sent and received currents.

## Locating Grounds in Cables.

In using the Varley or Murray loop test for locating grounds in cables, the results are not always satisfactory, due to faulty resistances in the conductors and to the difficulty of making perfect connections for the test. In lead-covered cable a ground or grounds between conductor and lead or conductors and lead can be located exactly, in the following manner:

Connect the lead sheath to one side through an adjustable resistance (lamps can be used) and the copper to the other side of any direct-current circuit and regulate the resistance so that two or three amperes will flow through the lead, the short-circuit and the grounded conductor. Use a galvanometer with leads having sharp metallic points for contact terminals and place the contacts a few feet apart on the lead sheath.

When there is a deflection on the galvanometer the testing connection is at some point between the connections to source of current and fault. When the fault is passed, there will be no deflection on the galvanometer. This may be done in different manholes until the nearest two points which can be reached, between which the fault is located, are found.

If the fault should be located at a point in a duct between manholes or where the cable cannot be reached, the section between the two manholes or points where the fault has been located must be pulled out and the same galvanometer test made every few feet, as the cable is being placed on reel, until the exact point of the fault is located.

In case of a foreign current flowing in the lead sheath due to defective return conductors of street railway systems, etc., there may always be a deflection on the galvanometer. In such cases the test current may be cut in and out during each test, and if the galvanometer needle swings, the testing connection is at some point between the source of the test current and the fault; if the deflection of the galvanometer is constant, the fault has been passed.

The Gerard method, using an induction coil and a telephone receiver, gives good results when the distance between the surface of the short-circuited conductors is not less than 5/16 of one inch. This method is not very satisfactory in places where the cable is located near an external and variable magnetic field, which will induce currents in the coil connected to the telephone receiver.

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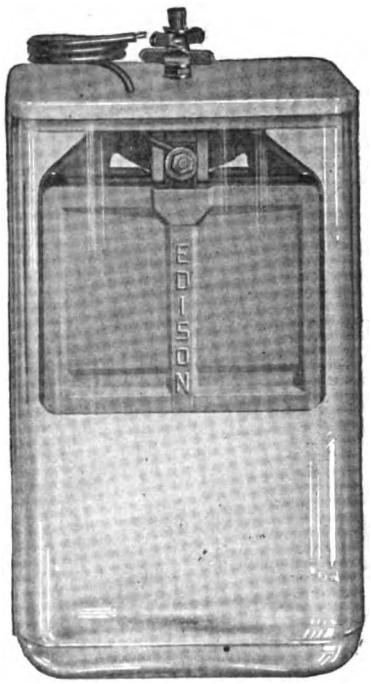
# FOR CLEAR TRANSMISSION

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### Efficiency Engineering.

*(Continued from page 17, January 1.)*

An official of a telegraph company writes us to the effect that one of the most frequent complaints against local officials in his division is that they do not pay their debts. He adds: "Many of these same individuals are extremely efficent in the management of the company's interests, and yet they cannot or will not manage their personal affairs to the satisfaction of those who are called upon to trust them. Please explain, if you can, how a subject of this nature can be remedied. It would be manifestly unfair to discharge such men, for in every other way they are efficient. At the same time the company is being annoyed by threats of law suits, garnishees and other legal methods of forcing collections."

We recognize that there is considerable ground for complaint of this kind. However, we believe that the official will occasionally be the victim of misplaced confidence if he imagines that most of the local officials complained of will keep their company affairs in as good a shape as though they were living within their means. An official of one of the bonding companies recently informed us that more than sixty telegraph managers in small offices had gone wrong within the previous three months. We will take it for granted, however, for the sake of argument, that certain local officials are supposed to be efficient in every particular except that they cannot take care of their own personal affairs. Take an individual case of this kind, he is the manager of an office, every day he is waited upon by two or three people to whom he has owed money for some time. They may be butchers, tailors, grocers, or the ever present money lender. While he is being interviewed on the subject of paying his debts a customer of the company, waiting to see the manager, hears sufficient of the conversation to convince him that the manager is not all that he should be. The company suffers accordingly. Other customers of the company learn of the shortcomings of the manager and, in the course of time, whether it is realized or not, the business of the telegraph company suffers to a greater or less extent. No business man entertains the same respect for a manager who does not pay his personal debts as he does for one that is above reproach. No business man would ever think of offering a telegraph manager a position with his firm if he knew that the manager did not pay his coal or grocer's bill as promptly as he should do. Just imagine, if you can, a banking institution securing the services of the local manager of a telegraph office, as is occasionally the case, and then it is observed by the president of the bank that the individual is called upon one, two or three times a week and asked to pay certain bills that he owes. Would the president of the bank conclude that a matter of this kind was none of his affair, or would he decide that it was a subject serious enough for him to take action upon? The conditions are all the same, whether they relate to banking institutions or telegraph management. The wrongdoing, however, trifling as it may be, of one official reflects on the employing interests.

In the chapter on efficiency printed in the January 1 issue of this paper we stated that a good business man, meaning a telegraph official, will always pay his bills promptly, particularly the small ones, for he realizes that if he is rated as slow pay in the community in which he resides it is a serious handicap to his advancement in that community or in the business world at large.

If efficiency means anything at all it stands for honesty as well as system. No man can be half efficient. If he lacks system he is not efficient. If he posseses system and lacks honesty he is not efficient. It is not efficiency to dodge creditors. It is most wasteful in time, and the time is at the expense of the employing interests in a majority of cases, and the resulting damage in reputations to all concerned is irreparable.

*(To be continued.)*

## THE RAILROAD.

### H. A. Shepard Appointed Superintendent.

Herman A. Shepard has been appointed superintendent of telegraph of the New York, New Haven and Hartford Railroad, with headquarters at New Haven, Conn., succeeding N. E. Smith, deceased.

Mr. Shepard has been in the telegraph service of the New Haven road since 1902.

P. W. DREW, until recently superintendent of telegraph, Soo Line, Chicago, and for many years secretary of the Association of Railway Telegraph Superintendents, has gone to Florida where he will spend the winter at The Oaks, Miami. Mr. Drew is accompanied by Mrs. Drew and it is their intention to remain in the south until next April.

### A Lineman From the Sky.

Little Mabel, aged four, to Mother: "In de sky do dey wear blue overalls and spurs on dey feet?"

Mother: "No, my dear, they wear wings. What gave you such an idea?"

Mabel: "Well, when I looked out of de window dis morning, I saw one of dem coming down a pole."

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## Protection Against Lightning and High Tension Circuits.

At the Chicago convention of the Association of Railway Telegraph Superintendents, special committee No. 5, J. F. Caskey, chairman, having in hand this subject, submitted a report which embodies the experience of the railroad telegraph departments with the various types of lightning arresters now on the market. The first section of this report appeared in the January 1 issue of TELEGRAPH AND TELEPHONE AGE.

### GROUND CONNECTIONS.

In view of the importance of good ground connections for the proper operation of any form of arrester, the following résumé of the different types of grounds and methods of installing them as shown by replies to the questionnaire sent out, is of interest:

(a) One inch galvanized iron pipe, top driven one and a half inches below surface, No. 9 copper wire soldered inside of pipe.
(b) Five feet and seven feet galvanized ground rods.
(c) Approved ground clamps attached to water pipes where available.
(d) Eight feet galvanized anchor rods.
(e) Five feet by one-half inch iron ground rods driven four and one-half feet in ground.
(f) Eight feet by three-quarter inch rods where good water pipes are not available.
(g) Brach hydro grounds placed six feet below surface and set in moistened charcoal.
(h) Ten feet iron pipe and in some places pipes as long as sixteen feet are used.
(i) Nine feet copper clad ground rod.
(j) One inch pipe filled with salt.
(k) Thirty-five to fifty feet No. 8 iron wire buried seven feet for way stations and one hundred feet No. 8 iron wire buried in moistened ground for terminals.
(l) Wire soldered to gas pipe or water pipe when possible to shut off water, making a good soldered joint.
(m) Paragon ground cones buried four to six feet.
(n) Galvanized iron ground rods of sufficient length to reach four feet below depth of frost.
(o) A coil of copper wire buried below the frost line in moist ground with a soldered insulated copper wire attached to the coil and extending to the arresters preferably in a straight line.

From this résumé it is evident that there is no uniform practice of installing and maintaining grounds. It is suggested that in a future report of this committee a recommendation be submitted for consideration of this phase of the subject.

### TEST OF GROUND CONNECTIONS.

In the matter of testing grounds, thirty-two roads report that they do not test grounds at all and those that do, do not seem to have any uniform method of standard practice, as is evidenced by the following:

(a) 100 volt battery with voltmeter used.
(b) Superficial tests only.
(c) Occasionally by wire chiefs when necessary.
(d) Voltmeter method from wire chief's test board. When a suspicious ground appears the star method with two temporary grounds is applied.
(e) Once each year, voltmeter and 200 volt test battery, fall of potential method, no fixed figures.
(f) Test through Morse board, monthly examination.
(g) Tests are occasionally made of suspected grounds, using Western Union specifications for measuring resistance of grounds.

From these reports it would appear necessary that a standard of ground resistance and method of testing be recommended, and it is suggested that in a future report of this committee recommendations be submitted for consideration along these lines.

### MAINTENANCE OF PROTECTORS IN SERVICE.

As to the number of lightning arresters or dirty carbons cleaned in one year, twenty-five roads report "no record kept," and the following are excerpts from the reports of other roads:

(a) On twelve divisions of one road, 1614 arrester grounds and dirty carbons were cleaned.
(b) 103 dirty carbons, seventy-five per cent being on yard circuits.
(c) Twelve due to lightning, but does not include defects due to broken porcelains in Argus arresters due to the strain of swaying towers and warping woodwork.
(d) Negligible as far as vacuum type arresters are concerned.
(e) Fourteen where grounds were located in copper blocks.
(f) Inspectors clean eighty-six "A" protectors on regular monthly inspection.
(g) Eight reported as cleared by other than operators, who do not report them.
(h) Forty-five reported as cleared, including those cleared by operators.
(i) About fifteen per cent.
(j) Forty to fifty blistered copper blocks.
(k) No trouble due to grounds or dirty carbons, as they are cleaned monthly.
(l) Estimated 400.
(m) Estimated 105.
(n) Twelve out of 350 were removed for inspection.
(o) Necessary to clean number of carbons during summer season.

In view of this record it is suggested that in the next report of this committee a recommendation be submitted which will result in a systematic inspection and a closer watch on this feature of protection, keeping in mind in so doing the possibility of adopting arresters of a self cleaning type which would avoid undue maintenance expense.

### PROTECTOR FAILURES.

In reporting the number of protector failures and the resultant loss in value of apparatus the replies are not sufficiently clear to be of real value. A number of roads report "no record kept," others "no failure" and "no losses," others as "negligible," and those reporting definitely show 250 failures with a total loss of $375.00 for one year. From this

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record it would appear that the protection in use is either highly satisfactory and performing its proper functions, or on the other hand, no proper method of keeping tab of failures and losses has been adopted. The difficulty of obtaining data on this point is recognized, and as the reports seem to show negligible losses the committee is not prepared to make any suggestions at present.

Without a single exception all roads report no fires in buildings resulting from protector failures on account of protectors not having been properly installed or from improper operation, and consequently there has been no property loss.

### ACCIDENTS TO EMPLOYEES FROM PROTECTOR OPERATION.

Outside of the cases shown below all roads reporting advise that there have been no accidents to employees on account of protector operation or failure of protectors to operate, viz.:

No injuries sustained, but one operator narrowly escaped injury by flying particles of fuses which were exploded by lightning.

No accidents, but fuses have been scattered in few instances.

One case where conductor was temporarily injured on account of standing on cinders in a pumping station. To avoid a recurrence wooden platforms have been built so that employees must stand on them while using telephone.

Two operators slightly injured while using despatcher's circuit, due to extreme lightning disturbance.

While this record does not indicate excessive danger to employees, it is suggested that in the next report of this committee a recommendation be submitted looking towards the highest possible protection to employees.

With the information obtained from replies to the questionnaire and after careful deliberation it was decided to confine our recommendations for this report to a few concrete points which have received the approval of the entire committee at a meeting held in New York, September 25.

In submitting these recommendations attention is called to the fact that while railroad property under the United States Railroad Administration is not being insured under policies of the different insurance companies, the committee nevertheless believes that the rules of the National Electrical Code should be adhered to as far as practicable under the conditions prevailing in railroad telephone service. While some of the reports received in answer to our questionnaire indicate practices in some cases radically different from those which we are recommending, a considerable number now conform in a general way and it is with a view to adopting standard and approved methods applicable to all that these recommendations are submitted.

In deciding on recommendation No. 3 we have endeavored to meet a demand for a definite rule as to breakdown voltages of protectors. This rule includes maximum and minimum limits, the former in order to insure adequate protection and the latter in order to avoid undue maintenance. In arriving at the figures shown we considered carefully the different types and makes of protectors now in service and have agreed that practically all types can be brought, if they are not now, within the scope of the proposed rule. In adopting the maximum breakdown of 750 volts D. C. we had clearly in mind the fact that a number of protectors have failed to break down except under very high pressure varying upwards to 2,500 and 3,000 volts which does not give adequate protection. Furthermore, we have had clearly in mind the necessity of reasonable maintenance and careful inspection with a view to at all times maintaining the breakdown voltage within the figures set by the proposed rule. A protector when installed may meet these requirements, but after being in service for a length of time may vary considerably from these figures and lose its protective qualities largely, if not entirely. In adopting the minimum breakdown voltage recognition was given to the possibility of a breakdown with consequent interruption to important service due to operating voltages used on selector circuits or on simplexed telephone circuits for telegraph service carrying voltages which might under certain conditions break down the protectors and unnecessarily interrupt service on important lines. Experience has shown that this is not only a possibility but an actual happening in a number of cases where protectors were susceptible to breakdown under low voltages. In addition the probability of crosses and other interferences which would not ordinarily throw a line out of service were considered in establishing the minimum figure as set at 350 volts D. C.

It is suggested that in a future report of this committee recommendations be submitted for the maintenance of protectors at their maximum and minimum breakdown point.

The committee realizes that from one viewpoint it has only made a beginning along the lines of "Protection Against Lightning and High Tension Circuits." At the same time it believes that the investigation, consideration and recommendations of this report will assist materially in enabling the railroads to obtain protection to their lines and apparatus from lightning and high tension circuits with a minimum loss or interruption to necessary and vital lines of railway communication.

### RECOMMENDATIONS.

Considering maximum protection to the equipment, employees and buildings, with the minimum interruption to the lines and apparatus owned and maintained by the railroads, we feel justified in recommending the following:

"All telephone and telegraph wires entering stations should be connected first through line fuses of seven to fifteen amperes capacity, then to arresters meeting the requirements of Recommendation No. 3 on office side of line fuses. Reports on vacuum arresters indicate that for the present it would be advisable to use an air gap arrester in multiple with each vacuum arrester. This recom-

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mendation is based on information that vacuum arresters now in service on railroad telephone lines do not maintain their low voltage breakdown at all times. Future development may eliminate the necessity of air gap arresters in parallel with vacuum types.

"Low ampere fuses (or heat coils) one-half to one ampere should be used between the arresters and the telephone equipment.

"The breakdown voltage of protectors used at telephone stations owned by railways shall be as follows:

"After installation, assuming reasonable maintenance, these protectors shall not break down on voltage below 350 volts direct current.

"They shall break down at 750 volts direct current."

## Telegraph and Telephone Earnings in Greece.

In Greece the telegraph earnings for the year 1916 were $1,121,856; in 1917, $1, 716, 243, and for the first three months of 1918, $1,033,482.

The telephone receipts were for 1916, $27,871; for 1917, $34,021, and for the first three months of 1918, $38,918.

In September, 1917, the rates were increased. Since that time the rate for a seven word message for the interior has been fourteen cents, and for telegrams of fifteen words, twenty-four cents, while the old charge was ten and twenty cents, respectively. For telegrams of more than fifteen words the rate is two cents for each extra word, as formerly. Messages destined to foreign points have since September, 1917, been taxed ten cents each surcharge, with the exception of telegrams destined to American and Egyptian points.

In September, 1917, the telephone rates were increased about thirty-three per cent.

## Good Things in Store.

Now that the war is over, telegraphers, both old and young, may look forward with pleasant anticipation to two events likely to take place in the not distant future.

The old timers already are inquiring as to when the next convention is to be held of the Old Time Telegraphers' and Historical Association. The members of the association who attended the previous convention in New York in 1916, all are enthusiastic for another gathering of the same kind. At the next meeting those who in the meantime have become "old timers" will likely be in attendance.

The younger men, especially the expert Morse and multiplex operators, have in store for them the excitement and enthusiasm which attend a telegraphers' national tournament. The speedy operators who joined the signal corps and were sent to France are returning with reports of high scores, and the next tournament will give all an opportunity to prove up.

## Hooverized Drafting.

BY W. S. G. DULIN.

Many of our tracings used as records of our plant are subject to frequent revision and these changes shorten the lives of the tracings very materially.

A scheme has been in use in some of our divisions which relieves the draftsmen of considerable erasing and redrawing and saves tracing cloth as well.

For example, cable diagrams must be changed frequently to record changes in the count of branch cables and whenever cable throws are made from one cable to another. The drafting work in such cases is much simplified by drawing the main cables and manholes on the reverse side of the cloth while the branches and the pair numbers are shown on the right side. Then when changes are made they do not involve the erasing and redrawing of considerable portions of the record adjacent to the changed section.

In the same way, drawings of individual blocks are made with the permanent structures on one side and the cable runs on the other.

The scheme has been applied to a number of other records and has been found very satisfactory by those who have used it.

## Improvement in Dry Cells.

The dry cell battery so indispensable in many applications of electricity has within recent years increased considerably in price. The increased cost and the relatively short life of dry cells have confined the use of the cell to installations where primary wet cells, storage cells, or commercial electrical power are not available.

The salvage from exhausted dry cells, apparently is of inconsiderable value. It has always seemed an extravagance to have to throw away cells by the hundreds when the chief defect has been a small hole in the zinc casing. A cell with a thick zinc electrode (the case) naturally lasts longer than one with a thin case, but the cost of the zinc is high, and manufacturers have aimed to keep the thickness of the zinc down to a point where its cost was commensurate with the life of the remaining elements of the cell.

Recent patents taken out covering dry cell construction provide for the deposit between the active paste and the zinc container of a layer of paste containing an alkaline bichromate, potassium bichromate, or chromium precipitate. The purpose of this protecting paste is to prevent or reduce corrosion of the zinc element, thus prolonging the life of the cell without increasing the thickness of the zinc.

The old wire chief says: "Do you think there is a good musician who does not know who composed 'El Capitan,' a good author who does not know who wrote 'The Clansmen,' or a good painter who does not know who painted 'The Horse Fair?' How many telegraphers know the date the first transatlantic cable was laid, or who invented the duplex?"

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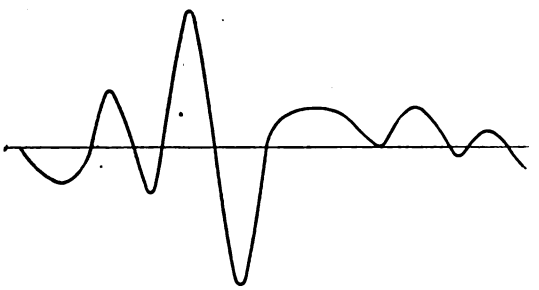
# MULTIPLEX TELEPHONY AND TELEGRAPHY

By FRANK B. JEWETT, Chief Engineer Western Electric Company, Inc.

The problem of multiplex telephony and telegraphy which the engineering departments of the American Telephone and Telegraph Company and the Western Electric Company, working in close cooperation, have solved, demonstrated and put into practical day in and day out commercial operation, is nothing less than the simultaneous use of a single pair of wires for many non-interfering telephone conversations, or many non-interfering telegraph messages, or, if need be, for both. Actually, the commercial service in which the system was demonstrated provides for five pairs of simultaneous non-interfering telephone conversations and two ordinary telegraph circuits on one pair of wires.

The opportunities for multiplex telegraphy which are opened up are great and for both telephony and

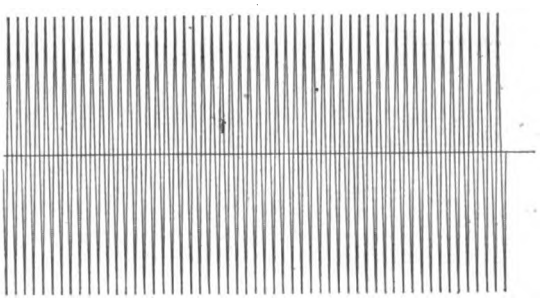


Here is shown a diagrammatic curve of the ordinary voice current produced in a telephone circuit.

telegraphy the practical limits are not now those imposed by physical possibilities.

It is now possible to operate many telephone circuits over a single pair of wires, be they long or short. But since terminal and intermediate apparatus to provide for the multiplexing involves considerable monetary expenditure, and since an extension of the number of multiplex circuits beyond a certain point would involve much expense in connection with the line, it is neither economical or practical to employ the multiplex system on very short lines, nor attempt to aproach what it is physically possible to obtain in the way of large numbers of circuits.

To most of us the picture of the modern telephone circuit and what goes over it is reasonably familiar. We know that it has long been possible to take two adjacent metallic telephone circuits and so arrange them as to provide for an additional or phantom circuit. Coincident with this phantom, we know also that each of the four wires can be employed for an ordinary telegraph circuit without interfering with its employment as a part of the telephonic highway. We know, also, that when we talk into a telephone transmitter we generate feeble electric currents which have very curious and complex forms, and which involve a wide range of frequencies—a range which extends up to more than 2,000 alternations per second. In a word, we know that if our telephone transmitter, receiver and line are good we will have in each part of the circuit a current which pictures a faithful reproduction of the disturbances which the voice produces in the air. We know also that if our circuit is to be satisfactory we must, so far as the receiver at least is concerned, be free from electric currents of voice frequency save only those produced in the transmitter used by the one to whom we are talking.



This is a visual representation of an unmodified high frequency current, in multiplex telephony. The high frequency current wave has impressed upon it the characteristics of the particular voice frequency to be carried by it.

If this is so, and if, as we know, all human voices employ about the same range of frequencies, how is it possible to use a single pair of wires for many simultaneous messages and have each message go only to the terminal apparatus for which it is designed? Why do they not all become mixed up and inextricably tangled? It was this difficulty which baffled so many men for so many years, and led to such a great number of ingenious proposals designed to keep separate messages separate.

We all know, or at least have heard, that there are ranges of frequencies, both electrical and mechanical, that are beyond the limits of perception by any of our five senses. But men have found out that currents of high frequency, for example, obey the same laws as currents of low frequency, and they found out further that these high frequencies have a particular liking for circuits specially dimensioned to receive them, and that each particular high

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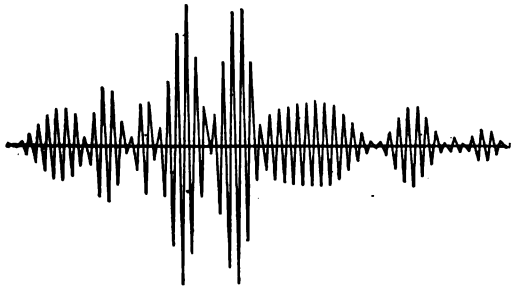
frequency, or range of high frequencies, if given a chance to choose between a number of different circuits, will select the one best adapted to its needs, and travel down it in preference to all other circuits.

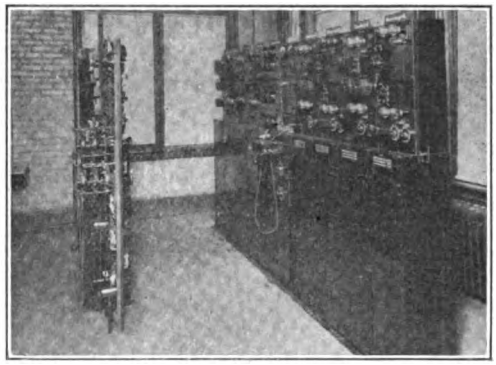
It is this peculiar property of selectivity between different high frequency currents which we have employed for combining and separating the various messages which are destined to travel together over a common pathway. But there is more to the problem than merely employing a number of different high frequencies and their corresponding circuits. We must in some way impress upon each of the high frequency currents the characteristics of the particular voice frequency which we wish to transport to the distant end of the line.

Fortunately, one of the devices which we developed in connection with the earlier work leading up to the transcontinental line and the transoceanic wireless telephone furnishes a ready means of so mixing an ordinary voice frequency with a higher frequency that an exact picture of the latter as it emerges from the device would show distinctly the effect which the relatively slow-moving voice current had had in lopping off the tops of the high frequency waves. The same ingenious device, the vacuum tube amplifier, can serve equally to divorce completely a union of high and low frequencies which may be handed to it. All this, of course, if properly associated with numerous other pieces of apparatus, the most notable of which are the filtering circuits, without which the vacuum tube would be impotent.



This picture illustrates a modified high frequency current. Note the effect of the slow moving voice current in cutting off the extremities of the high frequency vibrations.

Here, then, is the basis for the commercial plant referred to and now giving service between Washington and Pittsburg. Actually, the multiplex section of the line extends from the Tuxedo test station just outside the city of Baltimore to the Brushton test station, just outside the city of Pittsburgh. From Washington to Tuxedo, and from Pittsburgh to Brushton, there are provided as many ordinary telephone circuits as are required for the ordinary and multiplex use of the toll line between Tuxedo and Brushton—in this particular case five. None of these five circuits is in any way different from an ordinary telephone circuit, either from the standpoint of talking, signaling or operating. At Tuxedo or at Brushton each of the ordinary telephone terminals runs into its own particular piece of apparatus. One of the terminals, namely, that one which is to use a toll line in the ordinary way, goes directly to the latter through an equipment which prevents any of the outgoing or incoming high frequency currents from going back on the terminal. Each of the other terminals goes through an apparatus which, for outgoing transmission, combines the voice currents with a particular higher frequency current or carrier. This latter, when modulated by the voice currents, passes out to the toll line through an apparatus especially adapted to that particular carrier when loaded with its heterogeneous mass of voice frequencies, and to no other carrier. At the distant end of the line the first, or ordinary, conversation passes through its proper selecting apparatus directly on to the terminal designed for ordinary working, and each of the four other carriers selects its own designated circuit, where, after being divested of its carrier, the demodulated voice frequency goes out on an ordinary telephone line to the distant subscriber.



The apparatus at Tuxedo, near Baltimore, used for connecting five Washington circuits to one Pittsburgh circuit.

In the meantime, telegraph currents have been passing back and forth over the wires of the circuit without interference to or from the various voice and carrier currents that have been in play.

Thus it happens that at any given instant the two wires of the toll line have impressed upon them a heterogeneous mass of high frequency carriers, human voice currents, telegraph currents and such control currents as it may be necessary to employ for the proper operation of the terminal apparatus. An electrical picture of what is taking place in the toll line itself would be unintelligible to any of our senses.

Even before the transcontinental telephone line from New York to San Francisco had been installed it was realized that the work which had been done in connection with that problem would be of great assistance in solving the problem of multiplex transmission over wires, and more than four years ago apparatus was set up in the research laboratories of the Western Electric Company with which it was

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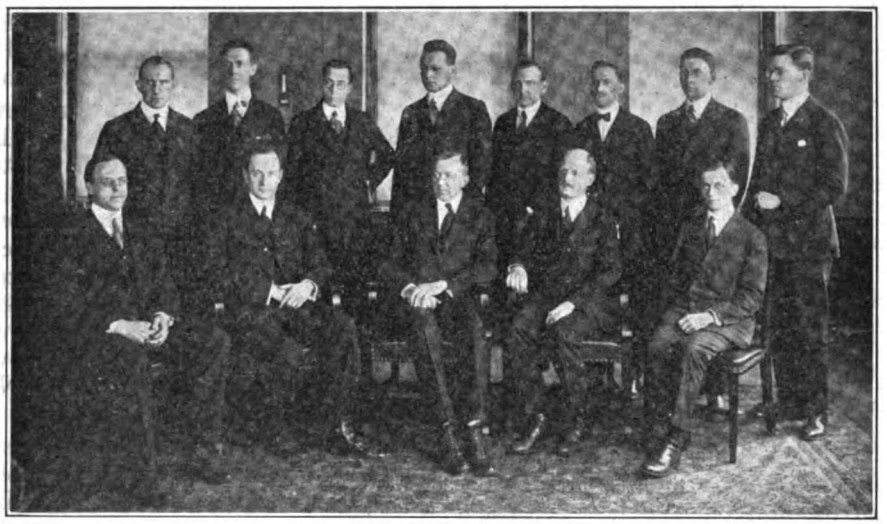
possible to carry on more than one conversation over a pair of wires. Following this the work was pushed, and in the latter part of 1916 and early in 1917 a trial installation was made and put into service on a part of the line between New York and Chicago. From the experiments on this line grew the installation now in commercial service between Washington and Pittsburgh, and in view of the telephone conditions which existed in Washington at the peak of the war load, it was fortunate indeed that we began developing this system as soon as we did.



Some of the men who have been closely connected with the development of the multiplex telephone. From left to right (Standing)—H. J. VENNES, WESTERN ELECTRIC CO.; E. O. SCRIVEN, WESTERN ELECTRIC COMPANY; LLOYD ESPENSCHIED, A. T. & T. CO.; H. A. AFFEL, A. T. & T. CO.; H. F. KORTHEUER, WESTERN ELECTRIC CO.; J. R. CARSON, A. T. & T. CO.; R. A. HEISING, WESTERN ELECTRIC CO.; JOHN DAVIDSON, JR., A. T. & T. CO. (Seated)—H. D. ARNOLD, WESTERN ELECTRIC CO.; O. B. BLACKWELL, A. T. & T. CO.; E. H. COLPITTS, WESTERN ELECTRIC CO.; B. W. KENDALL, WESTERN ELECTRIC CO.; H. S. OSBORNE, A. T. & T. CO.

**Associated Press Staff at Peace Conference.**

The staff of the Associated Press at the peace conference in France is made up as follows:

Melville E. Stone, general manager; Elmer Roberts, chief of the Paris bureau; Robert M. Collins, chief of the London bureau; Charles T. Thompson, superintendent assigned to foreign service; Charles E. Kloeber, chief of the staff with the American army; Salvatore Cortesi, chief of the Rome bureau; L. C. Probert, chief of the Washington bureau; S. B. Conger, former chief of the Berlin bureau; Edwin M. Hood, of the Washington bureau; Robert Berry, recently correspondent with the French army; F. B. Grundy, of the Paris bureau; J. A. Bouman, correspondent at Amsterdam; Burge McFall, James P. Howe and Philip M. Powers, correspondents with the American Army; Stuart Maroney, of the Paris bureau; S. F. Wader, correspondent with the French army, and T. T. Topping of the Paris bureau.

**Telegraph Report of Minnesota Forest Fires.**

The great forest fires which occurred in northern Minnesota in October last, causing the death of hundreds of people and destroying millions of dollars worth of property, presented a problem to the newsgathering associations in securing details of the disaster under very difficult conditions. Local representatives of the Associated Press, including T. J. McBreen and H. W. McGregor of St. Paul, Minn., and operators W. B. MacMahon and C. S. Curtis of Duluth, Minn., rendered noteworthy service in securing and sending out full telegraphic reports of the catastrophe.

**Forgot About the Code.**

"The expedition has returned from the Antipodesko," got by all right, but it would have looked better had the "ko" been translated.

**Noah the First Electrician.**

At least, after the flood had gone the limit, Noah had the arc light on Mount Ararat.

**Short Two Dots.**

The Dutchman, who after being stung, remarked: "Dash dot Bee," was shy a couple of dots.

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## RADIO TELEGRAPHY.

### Marconi Notes.

President Griggs, General Manager Nally and Commercial Manager Sarnoff have returned from Washington, where they were in attendance at the hearings on the house bill for government control of radio.

The fifth Christmas party at the executive offices was attended by one hundred employees and all of the officials, and was a most enjoyable affair. A buffet luncheon was served and an entertainer afforded much amusement. An orchestra was provided for dancing, and brief addresses were made by the general manager and others.

The high power station at Marion, Mass., has been released by the government.

William A. Winterbottom has been appointed traffic manager, vice George S. De Sousa, promoted to be treasurer.

G. E. CLARKE is manager of the London, England, city office of the Marconi Wireless Telegraph Company. Mr. Clarke is an experienced telegraph man, having been employed for several years by submarine cable companies.

HUGH MCCLAREN, radio operator on the United States battleship Oklahoma, is one of the star members of the dreadnaught's musical comedy organization known as the "Gobs." The company gave a performance of "O. K. Follies" in the Lexington opera house, New York, January 4.

### Radio Operators' Pay Fixed.

The United States Shipping Board has fixed the rate of pay for all chief wireless operators and assistant operators beginning January 1, 1919. The former are to receive $110 a month and the latter $85. There are to be no bonuses and no sliding scale. Robert P. Bass, chairman of the special wage commission authorized by the board, announced the award.

### New Radio Station at Annapolis.

The new Naval Academy radio station on Greenberry Point, across the Severn from the Academy, is at the present time the most powerful station on the continent. The first message was sent direct to Paris. Its aerials are hung from four steel towers, each over 550 feet in height, which cost $320,000. The entire station was built in seven months, fairly quick time considering winter weather conditions and labor shortage. Besides the towers and high-power plant, there are quarters for the officer in charge of the station, his assistant, the marine guard of forty men, and twenty-four operators. The total cost was $950,000.

### Radio Relieves Cable Congestion.

Postmaster General Burleson on January 4, issued an order to relieve cable congestion by routing a large number of government messages over the wireless to Europe. The order has been supplemented by a request to Secretaries Baker and Daniels to instruct military and naval officers abroad to observe this order in the routing of messages, the purpose being to relieve the strain upon the cables in both directions and facilitate cable service to the utmost. Mr. Burleson's order reads:

"Beginning today, all government cable messages addressed to Europe, unless specially stamped 'Not to be sent by radio,' may be routed by the cable companies by wireless. All government cable messages not of a confidential character may be transmitted by wireless. If cables are loaded beyond their capacity, cable companies receiving them will place same with radio for transmission. Cable messages falling within this class will be promptly filed for transmission at the Government Radio Office, Eighteenth and B Streets, N. W., Washington, D. C.

"As soon as restrictions are removed by naval censors code messages will be received and transmitted at both the Atlantic and Pacific cable offices."

### Amateur Radio Stations.

The ban has not yet been lifted on the operation of amateur radio stations. The government radio authorities advise that those who desire to install amateur stations may now make application to the district radio inspectors, and that when the ban is lifted these applications will be given attention in the order received.

VACUUM TUBES IN WIRELESS COMMUNICATION. By E. E. Bucher. Pages (6x9 inches) 174; illustrated. New York, August, 1918.

Mr. Bucher, who is instructing engineer, Marconi Wireless Telegraph Company of America, in the present work presents a volume which shows over one hundred different circuits for the practical use of vacuum tubes as detectors, radio or audio frequency amplifiers, regenerative receivers, beat receivers and generators of radio frequency currents.

A series of graphic charts in the appendix explains the functioning of the vacuum tube in an elementary manner. The technical introduction reviews the problems of continuous and discontinuous wave transmitters and receivers.

The book is ably written and the illustrations are clear and understandable. Telegraph students and engineers will find written in its pages a great amount of radio information along lines that are certain to be of importance in the operation of radio systems of the present as well as the future.

The price of this book is $1.75 and copies may be obtained by making remittances payable to John B. Taltavall, publisher, TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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## CANADIAN NOTES.

### John Mitchell, Traffic Superintendent, Eastern Lines, Canadian Pacific Railway Company's Telegraph.

John Mitchell, recently appointed superintendent of traffic, eastern lines, Canadian Pacific Railway Company's Telegraph, with headquarters at Montreal, Canada, entered the service in 1883 at the age of thirteen. Until 1886 he was employed, first as clerk and later as operator in the service of the Great North Western Telegraph Company. In the latter year he transferred his services to the Canadian Pacific Railway Company's Telegraph system, with which company he has remained since that year, with the exception of a two year period—1891-1893—when he was engaged in the brokerage and mining business in Colorado.

Re-entering the service of the Canadian Pacific Railway Company's Telegraph in 1893, Mr. Mitchell has made consistent progress through the various positions of assistant night chief operator, chief operator, circuit manager, and inspector, and his advancement to the position of superintendent of traffic is a recognition of his extensive knowledge of the business and his ability in promptly moving large volumes of telegraph traffic.

GEORGE A. WATSON has been appointed commissioner of the Manitoba government telephone system, with offices at Winnipeg, Man. Mr. Watson was for several years manager of the Tri-State Telephone and Telegraph Company, St. Paul, Minn.

L. VAN EVERY has been appointed traffic chief of the Toronto office, Canadian Pacific Railway Company's Telegraph, vice J. Smith, superannuated. G. A. Coates has been appointed agent at London, Ont., vice C. N. Souch, returned to the Toronto office as traffic chief.

### Here Tonight, McInnes.

P. G. Bowman, chief operator for the Canadian Pacific Railway Company's Telegraph at Calgary, Alba., Canada, had in his district for many years a telegraph lineman named C. E. McInnes. Each night as McInnes "laid up" somewhere along the line he sent to Chief Operator Bowman a telegram reading: "Here tonight. McInnes."

Early in the war Mr. McInnes entered the military service and apparently he has weathered the fight like a veteran, for, within the past week Mr. Bowman received a cablegram from London, England, which read: "Here tonight. McInnes."

S. E. BARTON, a well known old time and United States Military Telegrapher of Boston, now prominent in insurance circles, writes:—"I cannot see how any telegrapher can get along without the AGE. I cannot, and I have been forty-five years out of the business."


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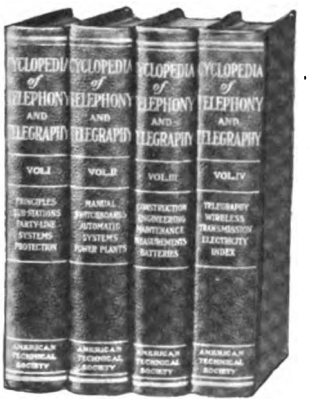

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## INDUSTRIAL.

### Economical Sounder.

The Diaphragm Sounder attachment for telegraph relays manufactured by the Railways Labor-Saving Device Company of Davenport, Iowa, and which does away with the necessity for local sounders and local batteries, has found a permanent place in the telegraph service. Introduced at a time when economy was imperative in the national interests the device has made good and those who use it will continue to derive the benefits of low maintenance costs.

GEORGE F. SIMONS has been appointed district sales manager of the Edison Storage Battery Company at Detroit, Mich., succeeding Bertram Smith, who becomes assistant general sales manager at the head office of the company, Orange, N. J.

### Low Frequency Alternating Current Telephone Ringer From 110 Volt, 60 Cycle Mains.

A new alternating current converter which operates directly from 110 volt, sixty cycle electric service mains, has been placed upon the market by the Kellogg Switchboard and Supply Company, Chicago.

The 110 volt alternating current is converted to direct current, which in turn is interrupted to obtain alternating current of about twenty cycles per second for the purposes of office signalling.

The curent to be rectified is taken from one side of the secondary of a transformer through a sixty watt carbon lamp and a forty watt tungsten lamp to opposite local contacts of a rectifier relay, while the opposite terminal of the transformer secondary is connected through the 1,000 ohm magnets of the relay.

The rectifier relay operates from alternating current and is bridged across the secondary of the transformer with a 2/10-MF condenser in series to cause relay contacts to make at the proper point of the current wave.

The vibrator magnets of the pole changer are also bridged directly across the secondary of the transformer with a No. 103 condenser in series to regulate its operation on alternating current. The non-inductive coil bridged across the vibrator contacts absorbs sparking.

The armature of the pole changer is kept in vibration on the well known principle of the ordinary electric bell or buzzer and is weighted so that its frequency of vibration is twenty cycles per second. This interrupts the direct current which is delivered to the pole changer springs from the rectifier relay springs.

The device is a thoroughly reliable and economical arrangement for furnishing telephone ringing currents of standard frequencies.

## OBITUARY.

B. M. DOWNS, identified with the Hemingray Glass Company of Covington, Ky., manufacturers of telegraph insulators and who died October 29, 1918, at the age of fifty-five, was well known to the electrical fraternity. He had been identified with the Brookfield Glass Company of New York for many years. He was a member of the telegraph and telephone fraternal associations.

JOSEPH L. LANEY, aged seventy-two years, a well known Augusta, Ga., telegrapher, died at Ybor City, Fla., November 28. Mr. Laney was identified with the Western Union interests at Augusta for over a quarter of a century.

PAUL A. GUYET, for the past twenty years supervisor for the Western Union Telegraph Company at Kansas City, died on November 10 of heart failure.

CHAUNCEY H. SMITH, aged eighty-three years, an old time Chicago operator, died in that city on November 28.

WILLIAM A. POWERS, for many years wire chief for the Western Union Telegraph Company, Detroit, Mich., died December 20, at Windsor, Ont. He was born in Canada in 1853, and entered the service of the Western Union at Detroit in 1872. Mr. Powers was widely known in telegraph circles and was a regular attendant at the reunions of the Old Time Telegraphers' and Historical Association.

JOHN W. PARSONS, a veteran of the United States Military Telegraph Corps, died on December 17, 1918, at Springfield, Ohio. He served in the telegraph corps of the Northern armies until the end of the war, his last service being at the Washington navy yard. Mr. Parsons had for many years been a prominent citizen of Springfield, and has been identified with many public movements having in view social uplift and betterment. He leaves a wife, a son and a daughter.

JOHN L. CAULFIELD, sergeant in the 112th Signal Battalion, on duty in France, formerly telegraph operator in Steubenville, Ohio, died in France, October 12, his death being due to pneumonia.

### Stock Quotations.

Following are the New York closing quotations of telegraph and telephone stocks on January 13:

| | |
|---|---|
| American Tel. and Tel. Co. | 101 |
| Mackay Companies | 71¾ |
| Mackay Companies, pfd. | 64-65⅞ |
| Marconi Wireless Tel. Co. of America (par value $5.00) | 4¼ |
| Western Union | 87½ |

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# Telegraph and Telephone Age

No. 3 NEW YORK, FEBRUARY 1, 1919. Thirty-seventh Year

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NEW YORK, FEBRUARY 1, 1919.

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### Capital and Labor.

The age old problem of maintaining the most efficient and progressive development of industry, while at the same time conserving the ethical, social and economic interests of the worker, is receiving the consideration not only of the best thinkers individually, but of practically every national and state government in the world.

Due perhaps to the inadequacies of language and to the universal tendency to adopt catch terms, the words "Labor versus Capital" in the past captioned a subject far too vast to be encompassed by these three or any other three words in the dictionary.

The voluminous and valuable contributions which have been made to the subject by both parties to the controversy during the past thirty years are today in a fair way to yield beneficial results which will register a material advance in the universal desire for peace and happiness.

The following quotation is indicative of present American ideas on the general subject:

"In the early days of industry, the functions of capital and management were not infrequently combined in the one individual, who was the employer. He in turn was in constant touch with his employees. Together they formed a vital part of the community. Personal relations were frequent and mutual confidence existed. When differences arose they were quickly adjusted.

"As industry developed, aggregations of capital larger than a single individual could provide were required. In answer to this demand, the corporation with its many stockholders was evolved. Countless workers took the place of the handful of employees of earlier days. Plants scattered all over the country superseded the single plant in a given community."

Obviously, this development rendered impossible the personal relations which had existed in industry, and lessened the spirit of common interest and understanding. Thus the door was opened to suspicion and distrust; enmity crept in; antagonisms developed. The parties to industry came to view each other and to think of their interests as antagonistic rather than common.

"It is to be regretted that there are capitalists who regard Labor as their legitimate prey, from whom they are justified in getting all they can for as little as may be. It is equally to be deplored that on the part of Labor there is often a feeling that it is justified in wresting everything possible from Capital.

"Thus the two forces have come to work against each other, each seeking solely to promote its own selfish ends. As a consequence have come, all too frequently, the strike, the lockout and other incidents of industrial warfare."

In a recent expression of views by a British industrial leader, we find the following:

"In the past, material prosperity has been considered as an aim and an end in itself. The material and ethical aspects of industry are as interdependent as a sound mind and a healthy body. The material side cannot be neglected, but if developed without reference to the ethical side, industrial activities become devoid of purpose and meaning, and humanly intolerable. * * * The principles which have been outlined, summed up in a phrase, suggest that in the industrial sphere that which is ethically right is economically desirable, and if we can seize the opportunity that is now presented to secure the application of these principles, a measure of life and well-being will be assured which we have never previously known."

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# CURRENT EVENTS

## Executive Office Announcements, Personal Mention, Appointments

### PERSONAL.

WALTER L. JONES, president and general manager of the Postal Telegraph-Cable Company of Texas, Dallas, Tex., was a New York City visitor on January 20, 21 and 22.

PAUL HAYNES, a member of the Indiana Public Service Commission recently appointed by Postmaster General Burleson to serve as a member of the committee on standardization of telephone rates, has declined the appointment. Mr. Haynes said that not only were the requirements of the Indiana Commission's post-war readjustment work too heavy to permit of his taking leave from that body, but also certain questions involved in the jurisdiction of the federal telephone control and the various state commissions caused him to decline the appointment.

L. W. SHOEMAKER is chief engineer for the Telepost Company, with office in New York.

C. W. GULICK, member of the United States Military Telegraph Corps, and a prominent constructor of telegraph lines in the early days, is now located in St. Paul, Minn.

BIDE DUDLEY, the well known newspaper writer, whose articles appear in New York daily papers, was at one time a telegrapher at Leavenworth, Kan., and St. Joseph, Mo.

JOSEPH L. OSMAN, for thirty-five years chief operator in the Pennsylvania Railroad telegraph office at Bordentown, Pa., has retired from the service.

G. M. WATERHOUSE, JR., telegrapher, recently in the service of the Baltimore and Ohio Railroad, is in New York on vacation, visiting with his father.

### WESTERN UNION TELEGRAPH CO.

THE COMPANY is erecting a new building on the site of 38 and 40 Broad street, New York, with a frontage of 41 feet on Broad street and 63 feet on New street, with a depth of over 150 feet, the building to be used exclusively for the downtown cable offices of the company. The new building will have a height of five stories on Broad street and seven on New street.

ROBERT ELLIS, writer of the account which appeared in the January 16 issue of TELEGRAPH AND TELEPHONE AGE, entitled "Catching a Wire Thief," is connected with the plant department, 195 Broadway, New York.

DAN MOSCOWITZ, formerly of the Denver, Colo., office, who recently moved to Omaha when that point became a divisional headquarters, has been advanced to the position of chief clerk to A. Long, division traffic superintendent.

SHIRLEY P. ENGLISH, aged twenty-nine years, son of Shirley M. English, general manager of the Western Union Telegraph Company, Dallas, Tex., died of pneumonia January 15. Mr. English had already become a prominent figure in telegraph and telephone circles. He was general attorney for the Southwestern Telegraph and Telephone Company, and for the Postal Telegraph-Cable Company of Texas. He was a graduate of the University of Texas, law department, and was exceedingly popular. On leaving the law school he went directly into the legal department of the Southwestern Telegraph and Telephone Company, and after four years' service as assistant general attorney he was advanced to the position of general attorney of the company. Mr. English is survived by his wife and a son.

### Managers' Meeting at Portland, Me.

A monthly meeting of the managers in this district was held January 16, at the Falmouth Hotel, Portland. The meeting was attended by Superintendents J. W. Reed, of Manchester, N. H., and W. G. Wetmore, of Boston.

### POSTAL TELEGRAPH-CABLE COMPANY.

O. T. MOORE has been appointed division cashier of the Southern division, with headquarters at Atlanta. Mr. Moore was manager of the office at Fort Monroe, Va., previous to his present appointment.

Managers appointed:—R. H. Miller, Fulton Market Office, New York; Margaret Gasper, Charlotte, Mich.; C. H. Ashburn, Norfolk, Va.; J. De Long, Alton, Ill.; C. Vincent, Sterling, Colo.; M. Pennington, Hot Springs, Ark.; G. L. Pierce, Indianapolis, Ind.; G. C. Wood, Ashland, Ky.; C. L. Brown, York, Ala.; T. E. McConnell, Anniston, Ala.; F. C. Becker, 2412 North Broadway office, St. Louis, Mo.; N. Keefe, Anaconda, Mont.; Irene Beavers, Palatka, Fla.; Foster Jackson, Quitman, Ga.; Ruth Rietti, Jackson, Miss. (PX office); R. M. Lazenby, Statesville, N. C.; Louise Decker, Fulton, N. Y.; P. E. Lindsay, Union Station, Washington, D. C.; W. F. Stanley, Stock Yards, St. Louis, Mo.; Charles D. Hellmer,

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Ottawa, Ill.; E. H. Plouff, La Salle, Ill.; F. W. Todd, Goshen, Ind.; W. C. Upham, Gloucester, Mass.; J. T. Hosea, Colorado Springs, Colo.; J. L. Listom, Erie, Pa.; W. H. Bassett, Pittsburg, Pa.; R. P. Newman, Suffolk, Va.; and G. C. Morgan, Cotton Exchange, Houston, Tex.

HARRY THOMPSON, operator in the main office of the Postal Telegraph-Cable Company, Philadelphia, Pa., recently observed the thirtieth anniversary of his continuous service in that office.

A. C. TELLER, foreman of the pneumatic tube department in New York, has been laid up a few weeks on account of sickness.

## Philadelphia Notes.

The board of governors of the Dot and Dash Club has arranged for the annual meeting of the club on March 3. The program will include a musical entertainment, followed by luncheon. The club includes in its membership those who are now or who have been identified with the telegraph business. C. E. Bagley is president, Robert C. Murray, secretary; James H. Wilson, treasurer, and Alfred G. Strickland, chairman of the board of governors.

The Electrical Aid Society of Philadelphia held its thirty-first annual meeting on January 15. The following named officers were re-elected for the coming year: C. A. Huver, president; John A. Chapman, vice president; W. E. Vanarsdall, recording secretary; R. C. Murray, financial secretary, and James H. Wilson, treasurer. The annual report of President Huver showed that the affairs of the society are in a highly satisfactory condition. After the transaction of routine business refreshments were served, followed by music and dancing.

## New York Western Union.

The regular monthly meeting and dinner of the assistant chief operators' local No. 70, Association of Western Union Employees, was held at Peck's French restaurant, New York, Wednesday evening, January 8, at which Assistant Chief Operator S. C. Crumpton read a paper on "The Value of Understanding the Other Man's Difficulties." The usual good attendance at these informal affairs was noted, the guest of the evening being Chief Operator G. C. Gute of the New York main office. Mr. Gute spoke in his inimitable way of the great advantage of social gatherings of this kind, whose tendencies must be apparent to all in the closer co-operation they engender, and he puctuated his talk with many amusing and instructive anecdotes. The party was a thoroughly enjoyable one and the members spent the remainder of the evening in general discussions of timely topics.

BENJAMIN LIEBOWITZ, manager of the 621 Madison Avenue office, who died recently, was one of the company's most progressive metropolitan managers.

DANIEL E. PIKE, aged seventy-one years, operator, died at his home in Brooklyn, January 9.

W. E. PEIRCE, of the testing and regulating department, Washington, D. C., was a recent New York visitor. Mr. Peirce was identified with the New York office for many years prior to going to Washington.

L. KARSCH, of the United States Signal Corps, and who received his military training at Camp Vail, has returned from the service and has taken a position in the New York main office.

## Chicago Western Union.

J. J. WELCH, traffic engineer in Vice-President Fashbaugh's office, New York, was a welcome visitor in Chicago last week.

DIVISION TRAFFIC SUPERVISOR COOMBS, of the Cincinnati district, has been transferred to Chicago in the same capacity.

Many of the 500 odd employees of the company who left the Chicago district to join the hosts fighting the Kaiser, soon will be coming back, and they shall be welcomed. It would be impossible to find anywhere a finer lot of men, either as expert telegraphers or as real American citizens. Their deeds in the fighting zones will for all time redound to the credit and glory of Chicago W. U.

CHIEF OPERATOR E. T. JONES recently had paid him by a high officer of the company a compliment which reflects the confidence in which the local management is held. In an emergency Mr. Jones was asked immediately to send a number of experts to a distant point for service. When he replied that he would comply at once the official said: "I knew you would. You could easily equip a half dozen offices from chief operators down to messengers, and all of them experts, too."

The force is receiving no little praise for the speed and smoothness with which the holiday telegraph traffic was handled. On Christmas day, between 8 a. m. and 5:30 p. m., 350,000 messages were passed through the office.

The entire staff, men, women, boys and girls, are looking forward in pleasant anticipation to the day during the coming summer when the main office is to be moved into the new quarters now being prepared. All signs point to the conclusion that we are going to have the finest telegraph office in the country.

JACK MILLER, assistant chief operator, was away a few days on account of the illness of Mrs. Miller.

GRACE SHAIBLE, from this office, who has been helping out in the national capital, has returned to duty here.

F. W. PUGH, chief clerk to the general wire chief, during the liberty loan and war savings stamps campaigns established an enviable reputation as a bond salesman and made a high record for the Chicago office. Mr. Pugh also is a local representative in Chicago of TELEGRAPH AND TELEPHONE AGE.

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### Washington Western Union.

OSCAR MCCULLEN, wire chief, is in New York on a week's vacation. He is relieved temporarily by Clyde Townsend.

ANDREW JACKSON LOMBARD, who has served fifty years in the Washington office, and who is one of the oldest living operators of printing telegraphs in the country, celebrated his seventy-fifth birthday on January 8. Among his telegraph friends present were Herbert Wright, Harry McKeldin, Dennis Brown, R. C. Lugenbed and Ollie Latchford. Mr. Lombard was the recipient of several useful gifts.

E. HERBERT BASS has been appointed force chief of the multiplex department, vice Thomas Haley, who has gone to Harrisburg, Pa., as assistant chief operator. J. E. Little has been appointed general traffic chief, and Henry Pfaff, night chief operator.

### Northern Telegraph Company Election.

The annual meeting of the Northern Telegraph Company was held December 31, 1918, at Manchester, N. H., the following officers being elected for the ensuing year: President, Mrs. Marion Cossar Smith; clerk, Arthur H. Hale; directors, Mrs. Smith, A. H. Hale, Charles H. Anderson, and Arthur E. Clarke. The treasurer of the company, A. F. Emerson, was continued in office. A dividend of two per cent. was declared.

### Pan-American Telegraph Notes.

BOLIVIA.—A telegraph line is being built from La Paz to Parquepujio. Within the past few months a telegraph school has been opened to train men for the telegraph service.

CHILE.—The telegraph congress which met in Concepcion in September, 1918, among other things, recommended the publication of a monthly periodical in the interests of telegraphers; the establishment of a federation of Chilean telegraphers with insurance, mutual aid and educational departments; the pensioning of telegraphers after twenty-five years' service; the construction of another telegraph line from Temuco direct to Santiago; a minimum salary of $48.00 per month with an eight hour day; increased rating for extra service, and rewards for long and efficient service.

MEXICO.—A radio telegraph station has recently been established at Pungarabato, state of Guerrero, powerful enough to communicate directly with the stations at Chapultepec, Acupulco, and other distant points of the republic.

## THE CABLE.

Cablegrams may now be forwarded to places in Alsace and Lorraine, at sender's risk and subject to delay.

The censorship has removed the restrictions on social and personal cablegrams to be transmitted via the Commercial Pacific Cables.

W. HIBBERDIE, traffic accountant of the Eastern Telegraph Company, Eastern Extension, and Australasia and China Telegraph Company, died suddenly in London, England, January 23.

### Death of Frederic Ward.

Frederic Ward, manager in England, of the Commercial Cable Company, died suddenly on January 23, at London.

Mr. Ward was born at Cambridge, England, on March 11, 1850. He was educated in his native place, and entered the telegraph service immediately on leaving school. He was for some years in the employ of both telegraph and railway companies in England. On the establishment of submarine telegraphy to the Far East fifty years ago, he went to Italy and Sicily and was afterwards transferred to Aden in the Red Sea, where he remained for some time. When the Japanese government decided to introduce the telegraph into that country, he, with three or four others, was selected to go to Tokio, to teach the Japanese the art. He remained in Japan eight years, and was decorated on two occasions by the government of Japan for his services to that country. He visited the United States in 1879, and after enjoying a well earned vacation, accepted a position as superintendent at Sydney, Cape Breton, in the service of the French Atlantic Cable Company. On the organization of the Commercial Cable Company, in 1884, he entered that company's employ as superintendent at Weston-super-Mare, England. After remaining there for eleven years he was made manager in England on the first of January, 1896, and filled that position until his death. He leaves a wife and two sons; one son is a captain in the British Army and has been at the front since the beginning of the war.

Mr. Ward had been a great traveller and had a large experience; he was a man of much ability and an excellent linguist, speaking the continental languages fluently, as well as being conversant with several of the Oriental tongues. He was a brother of George Gray Ward, vice-president and general manager of the Commercial Cable Company, New York.

### Central and South American Telegraph Company Proposes Capital Increase.

A special meeting of the Central and South American Telegraph Company has been called for February 11, to vote on the proposal to increase the stock from $14,000,000 to $25,000,000.

### Cable Concessions in Uruguay.

A resolution of September 24, 1918, contained important provisions with reference to cable concessions in Uruguay.

Article 1 of the resolution refuses to grant the petition of the Western Telegraph Company for the extension for thirty years of its concession which expired on July 15, 1917.

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Article 2 provides for the presentation to the chambers of a bill regulating cable concessions.

Article 3 authorizes the Central and South American Telegraph Company to extend its telegraph and telephone lines from Buenos Aires to Montevideo.

A statement published in connection with this resolution shows that the Western Telegraph Company has enjoyed an exclusive concession for telegraphic communication with Brazil, Europe, North America, the West Indies, the Guianas, Venezuela Colombia, Central America, and Africa. In applying for an extension of this concession, the company offered the Government one per cent. of the charge per word on all messages to and from Uruguay as well as transit messages, the company to enjoy complete exemption from taxation on its equipment and properties.

The statement further reveals that the Compañía Telegráfica Alemana Sudamericana (a German concern) applied several years ago for the permission to extend its lines from Pernambuco to Montevideo and that this permission was refused because the Western concession was still in force. It appears that the local representative of the German company has been active in opposing the extension of the Western concession.

With the expiration of the Western Telegraph Company's concession the Uruguayan government proposed to establish competition among cable companies and exclusive concessions will not be granted, privileges and monopolies being reserved to the state. It appears that the bill to be presented to the chambers will provide for the granting of concessions for not over thirty years, the concessionaires to enjoy no privileges or exemptions of any kind. On the other hand, the Government will not subvention companies nor otherwise give preference to one company as compared to another.

It may be recalled, in this connection, that while the Western Telegraph Company has enjoyed an exclusive concession as respects the countries and continents noted above, cable communication with Buenos Aires has thus far been maintained by two local lines. These lines belong, respectively, to the Compañia Telegráfico-Telefónica del Plata, a subsidiary of the Deutsch—Sudamerikanische Telegraph-engesellschaft, the German company (also known as the Compañía Telegráfica Alemana Sudamericana) which has already applied for permission to extend its lines from Pernambuco to Montevideo. The Central and South American Telegraph Company used up to April, 1918, the lines of this German-owned concern for its traffic between Montevideo and Buenos Aires. Since last April, by special agreement, the Compañía Telegráfica del Rio de la Plata (Western subsidiary) has been dispatching and receiving the Montevideo business of the American company, thus eliminating the German lines.

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The old wire chief says: "Unless you are a good listener you are not likely ever to have anything important to say."

## Radio Telegraphy.

MARCONI NOTES.

At a meeting of the directors of the Marconi Wireless Telegraph Company of America, held at the offices of the company January 14, a dividend was declared at the rate of five per cent. on the outstanding stock of the company, payable July 1, 919, out of the surplus profits, to stockholders of ecord at the close of business June 1, 1919.

EDWARD J. NALLY, vice-president and general manager, sailed from Halifax on the steamer Olympic, January 25, for England, on a business trip.

WILLIAM E. BROCK has gone to Mexico City on business of the company.

ROBERT C. HOCK has been appointed cashier at the main office, New York, vice Miss G. Reynolds, transferred to the treasurer's department.

ALEX E. ROACH, engineer, sailed on the steamer Saga for Buenos Aires, January 22, to supervise the erection of the high power station for the direct New York service.

FRED. H. SCHNELL and PAUL S. PFEIFER, navy radio operators on the George Washington, which carried President Wilson and his party to France, a few years ago were amateur radio enthusiasts in Chicago.

J. A. POHL, chief gunner, United States Navy, formerly superintendent of the Gulf Division at New Orleans, is now serving as radio repair officer at Marseilles, France, where he has recently received high commendation from his commanding officer for the high efficiency of his work.

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## Communications Conference in Paris.

A provisional inter-Allied communications conference is now being held in Paris, France, to consider many matters relating to international electrical communication, one of which is the standardization of radio communication.

The American representatives at the conference are six naval officers, headed by Rear Admiral W. H. G. Bullard, formerly director of naval communications, and his successor, Captain W. D. Todd.

In a statement explaining the purposes of the conference, the Navy Department said it was possible that the meeting would make recommendations for permanent international action to be taken by the International Radio-telegraphic Conference a meeting of which called to be held in Washington in 1916 was postponed because of the war.

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## Telegraph and Telephone Life Insurance Association Annual Meeting.

The annual meeting of the Telegraph and Telephone Life Insurance Association will be held at 195 Broadway, New York, on Wednesday, March 12, at 4 p. m.

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## CANADIAN NOTES.

GEORGE D. PERRY, general manager, and Charles E. Davies, superintendent of traffic, Great North Western Telegraph Company, Toronto, Canada, were in New York on business for a few days recently.

R. A. GOODING is agent at Tagish, B. C., for the Canadian Government Telegrahs, and W. D. Slocombe is agent at Nanaimo, B. C.

### Electrical Imports Into Canada From the United States.

Recently issued trade statistics show that during the years 1916-17 Canada imported from the United States electrical supplies as follows: Copper wire, $35,000; electric light carbons, $66,000; incandescent lamp bulbs, $115,000; telegraph and telephone supplies, $4,174,000; electric motors, generators and dynamos, $1,397,000; iron and steel wire, $188,000; lighting fixtures, $448,000.

### Ladylike Relays.

An official of a Canadian telegraph company recently received from an office in Quebec a letter explaining why the office had not responded to calls by wire the day before. The letter, which was written by the French-Canadian operator, read: "My key he broke, my relay she no work."

The question of gender thus raised caused no end of learned debate among the staff at headquarters, but it is presumed that in the meantime the supply department was instructed to ship at once a real He-Man key and a regular doll of a relay.

### Telephone Service in the Philippines.

We are advised through the press of the great prosperity now evidenced in the business centers of the Orient. Manila, the principal city of the Philippine Islands, is showing a wonderful expansion in industry and activity. It has a population of 350,000, and under the direction of the United States authorities has developed into a modern, cleanly, enterprising, well governed metropolis.

A few facts in regard to the telephone situation in the city may be of interest. Up to the year 1903 the system, composed of about 400 telephones, was the property of the Queen of Spain and was operated under the direct supervision of the local Spanish government. During that year it was purchased by the Philippine Telephone & Telegraph Company, which now operates in the city proper and renders service to 7,500 subscribers. There are four exchange buildings in the city. There is some outside toll business, but this is entirely under the control of the United States government and the service is maintained principally for various military posts outside of Manila.

One hundred and twenty-five telephone operators, young women and boys, mostly Filipinos, are employed. Each operator must understand three languages—Spanish, English, and the native Taglog. Five American traffic supervisors are employed. The combination and construction people are all native Filipinos, but the forces are supervised by ten Americans.

There is very little overhead construction in the city on account of the rapid depreciation attendant upon local climatic conditions. The company, through reasonable arrangements with the city, avails itself extensively of city fire alarm and police poles. The apparatus is entirely of American Bell design, supplied by the Western Electric Company.

The labor situation is a matter of some concern to the telephone management, as the *"manana"* spirit of the tropics is reflected in this industry as well as all other lines of activity. A small accumulation of wages by the ordinary employee in the tropics quite frequently means an indifference, while the surplus lasts, to any contractual relations of service. This is met somewhat by the payment to telephone people of from fifteen to twenty per cent. more in wages than is paid in ordinary business lines.

The president of the company is Louis Glass, for many years connected with telephone interests on the Pacific Coast. W. Z. Smith has been manager of the company for the past five years. Mr. Smith is a graduate of the electrical department of the University of California, and before his departure for the Philippines worked in different capacities for the Pacific Telephone & Telegraph Company on the Coast.

### Railroad and Telegraph Company Contracts Hold Good.

Rulings of lower courts knocking out the Interstate Commerce decision of March 28, 1916, in which it was contended, invalidated contracts between railroads and telegraph companies, were affirmed by the Supreme Court January 20.

The railroads and telegraph companies had contracts for interchange of service, either free or at reduced rates, the roads transporting materials and the telegraph companies favoring the roads in sending messages.

The Interstate Commerce Commission decision was that the transportation of material by the roads at low cost was legal where the materials were for use along the lines of the roads, but illegal where the materials were used off the line.

The telegraph companies said they did not know exactly where they stood, and to make a test case refused to abide by their contracts. Lower courts ruled against the Interstate Commerce Commission in three separate cases.

### Good Things Coming.

In the February 16 issue of TELEGRAPH AND TELEPHONE AGE we will have the concluding installment of the Van Rysselberghe story by William Maver, Jr.; an important story on radio telegraph development, and other features of importance to telegraph students.

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## PROGRESS OF GOVERNMENT CONTROL OF TELEGRAPH, CABLE AND RADIO.

In the past two weeks there have been no decisive developments in the telegraph situation, with the exception of the action of the House merchant marine committee in sidetracking the proposal looking to government ownership of wireless telegraph systems.

### RADIO NOT TO BE TAKEN OVER.

By unanimous vote the members of the merchant marine committee decided to make no attempt during the present session of Congress to further the administration measure proposing government acquisition of all wireless telegraph stations.

Representative Alexander of Missouri, chairman of the committee, said the members realized it was useless to attempt to frame a bill so that it might be considered by Congress during the few remaining weeks of the session. If agreement was reached, he doubted whether the measure would be brought up for passage in the present Congress.

Republican members of the committee voiced opposition to the bill which they declared was an opening wedge of a general policy of government ownership of public utilities.

Under the measure wireless would be put under the navy department and all privately owned stations would be taken over permanently by the government.

### STATUS OF SUBMARINE CABLE SEIZURE CASE.

As announced in our January 16 issue Judge Hand, of the Federal District Court in New York, dismissed the injunction suits brought by the Commercial Cable Company and the Commercial Pacific Cable Company to restrain Postmaster General Burleson and Newcomb Carlton, director of cables, from merging the submarine cables of these companies with those of the Western Union Cable system.

Judge Hand, however, allowed the attorneys of the Mackay Companies to appeal direct to the United States Supreme Court from the decree dismissing the suits.

On January 25 motions were filed in the Supreme Court asking expedition of the appeals brought by attorneys of the Mackay Companies.

"Not only is this litigation of the utmost consequence to the complainants, whose property has been seized," said counsel for the companies, "but the proposition that the exercise by the executive department of the government of a power delegated by Congress cannot in any circumstances be questioned, reviewed or passed upon by the courts, is a proposition of the utmost public consequence."

The motions were taken under advisement, but court officials expect that arguments will be heard at the present term of court.

### GOVERNMENT OWNERSHIP OF TELEGRAPHS.

Testifying before the House Postoffice and Postroads committee, W. H. Lamar, solicitor of the Postoffice Department, said that individually he is opposed to government ownership of public utilities, but that he thought the question should be investigated during the proposed extended period of control in order to prevent chaotic conditions.

Mr. Lamar stated his belief that financial losses, and in some cases ruin, would result to certain companies unless government operation of the wire companies is extended for at least two or three years to permit general reconstruction of rates and restoration of normal conditions.

The hearings before the Postoffice committee which have continued during the past two weeks have been characterized by a great deal of bitterness; especially the verbal clashes between Judge Moon of Tennessee, chairman of the committee, and Edward Reynolds, vice president and general manager of the Postal Telegraph-Cable System.

It developed during the testimony that Mr. Reynolds had been dismissed from his position December 1 because he had indorsed a letter written by one of his subordinates urging delay and obstruction to the federal plan of control.

### OTHERS DEFEND REYNOLDS

"You were dismissed were you?" asked Judge Moon.

"I certainly was," replied Mr. Reynolds.

"Because you were treasonable?"

"I take exception to that!" cried Mr. Reynolds, while members at the other end of the table shouted, "No! no!" One of them, Mr. Madden, interjected:

"That should be stricken from the record."

"You were disloyal to Mr. Burleson," continued Judge Moon.

"My daughter and son are in France, and I won't permit you or any one else to impugn my loyalty," responded Mr. Reynolds.

"I think we should proceed with the hearing as if the witness was a human being," said Mr. Madden. "There's no reason the power of the government should be used to bulldoze the witness."

The letter in question was of a few lines, indorsing another communication in which a division general superintendent said that "as the war was over" the Postmaster General's plans should be retarded.

### Government Control to End This Year.

The House Committee on Post Offices and Post Roads, on January 28, by a vote of ten to eight, approved and reported to Congress a resolution limiting the period of federal control of telegraphs and telephones to December 31, 1919. The measure is now before Congress for action.

G. D. BUTLER, at one time and for many years manager for the Western Union Telegraph Company at Rochester, N. Y., and now living in retirement, in renewing his subscription to TELEGRAPH AND TELEPHONE AGE, says: "The AGE is a welcome visitor to me in my retirement and brings interesting information regarding improvements in the service as well as items of interest about former associates and acquaintances."

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# Signal Corps Development of Vacuum Bulbs for Radio Signaling

In the lecture delivered before the American Institute of Electrical Engineers, New York, Friday evening, January 10, by Major General George O. Squier, chief signal officer of the United States army, the following statements were made regarding the development of the thermionic bulb, otherwise known as the audion:

### RADIO DEVELOPMENT WORK

In the question of the engineering achievements of the Signal Corps during the war, the development of radio apparatus forms a large part. Inasmuch as the vacuum tube occupies so prominent a role in almost every kind of radio apparatus, an outline of its development logically precedes discussion of the radio sets.

### VACUUM TUBES

The application to radio inter-communication of the vacuum tube—perhaps more properly called the themionic tube or bulb—is one of the most interesting developments in the whole field of applied science. For not only has it made possible what has been justly heralded as one of the most spectacular achievements of the whole war—the airplane radiophone—but the confidence growing out of the extensive experience with the vacuum tube in warfare, coupled with its extreme adaptability, have resulted in a rapidly increasing amount of radio development involving its use.

### PRE-WAR HISTORY

The vacuum tube was known in various forms before the war. Following extensive experiments with the so-called "Edison effect," Fleming, some years ago, produced the well known Fleming valve —a current rectifying device, capable of being used as a detector of radio signals. This device contains two elements: an incandescent filament emitting electrons, and a plate upon which an alternating voltage is impressed, both placed within an evacuated bulb. Later Dr. Lee DeForest introduced an important modification by placing a wire mesh or "grid" between the filament and the plate. A small voltage variation on this grid produces the same current change through the tube as would a much larger voltage variation on the plate, thus adding amplifying properties to the detector characteristics of the Fleming valve. DeForest called his device the "audion." Later, with superior facilities for evacuation available and with more intimate knowledge of the laws of thermionic emission from hot bodies, improvements and modifications were made in the audion or vacuum tube by both the General Electric Company and the Western Electric Company, the latter designating their product as "vacuum tube," and the former the "pliotron."

In addition to acting as detectors and amplifiers, as mentioned above, vacuum tubes can function in two other important ways:

1. As Oscillators. In properly designed circuits containing inductance and capacity they will act as radio frequency generators, for use in transmitting or receiving radio signals.
2. As Modulators. By suitable connection to an oscillator circuit or antenna, they can be made to vary the power radiated so that the envelopes of the waves transmitted shall have any desired wave form, as for example, the speech waves from an ordinary telephone transmitter.

The most striking use made of vacuum tubes prior to the time we entered the war was the transmission of speech by radio from Washington to Paris and Honolulu, during the experiments carried out by the American Telephone and Telegraph Company and the Navy Department. Vacuum tubes were used as the radio frequency generator for transmitting, and for detector and amplifier in receiving.

When the United States entered the war, vacuum tubes already were in use by the Allied forces for various signaling purposes. The French particularly had been quick to recognize the military value of vacuum tubes and had, previous to June, 1917, developed very creditable tubes and apparatus. In America, tubes were in limited use as "repeaters" on telephone lines, and as detectors and amplifiers in laboratories and radio stations. The total production, however, in this country did not exceed three or four hundred a week.

### DEVELOPMENTS DURING THE WAR.

Early in our participation in the war, it became evident that vacuum tubes would be required in very large quantities in order to meet the growing demands for radio communication and signaling. It was equally evident that service conditions, not hitherto anticipated, would require great mechanical strength, freedom from disturbance under extreme vibration, and uniformity of product sufficient to make possible absolute interchangeability of the tubes in sets, without the necessity of readjusting when changing tubes. To these conditions must be added that of minimum size consistent with dependable operation.

To make such a device with its complicated, yet accurately constructed metallic system, within a practically perfect vacuum, is no small problem even when made in the laboratory, on the individual unit basis, by a skilled operator who appreciates the delicacy of the job. To turn out tubes by the thousands by factory methods involves almost infinitely greater difficulties. How well certain companies, in collaboration with the Signal Corps, have succeeded in solving these difficulties is indicated by the fact that recently the total rate of production in the United States of high quality standardized tubes was considerably in excess of one million a year. This rate of production could be made many times greater on short notice.

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As an example of the difficulties which this quantity production has involved may be mentioned that of evacuation. The degree of vacuum required is such that unusual methods of exhaust are necessary. The heating of the tube in electric ovens is supplemented by heating of the elements of the tube by excessive filament and plate electrical power input. Molecular pumps are employed necessitating an extremely large number of pumps to handle quantity production. Special treatment of metal parts prior to assembly is employed to reduce the gas given off by them during the exhaust process.

Another problem is that of making the complicated metallic structure of all tubes exactly alike, in order to insure identical electrical properties. As an indication of progress in this direction, it may be stated that one company is prepared to manufacture, in quantity, a certain tube in which the clearance between filament and grid is only three hundredths of an inch, the allowable variation being of course only a small percentage of this.

Manufacturing in quantity involves careful inspection. The problem of specifying definitely the required performance of tubes, the development of adequate testing specifications, the placing of standardized testing and inspection methods, personnel, and equipment in the various factories so that tubes manufactured at different times and places would, after passing inspection, be uniform and interchangeable—these questions were entirely new and have been solved almost entirely by the Signal Corps engineers.

PRESENT STATE OF THE ART

Tubes developed by the Signal Corps may be divided into two general classes: the tungsten filament types as developed and manufactured by the General Electric Company and the De Forest Radio Telephone and Telegraph Company, and the coated filament or Wehnelt Cathode types as developed and manufactured by the Western Electric Company. The coated filament tubes so far have proven superior to the tungsten filament tubes for Signal Corps use. Both classes have been standardized as regards base, exterior dimensions, filament current and voltage, and in addition, plate voltage and output for transmitting tubes; and amplifying power and detecting power for receiving tubes. Except in certain special cases, the Signal Corps uses two types of tubes, one for transmitting, and another for receiving. The French and the British have been using one type for both transmitting and receiving, but present tendencies of the British are toward different tubes for different duties.

Vacuum tubes are now employed for electric wave detection, radio frequency and audio frequency amplification, radio telephony, particularly in the airplane radiophone, continuous wave radio telegraphy, voltage and current regulators on generators, and for other miscellaneous purposes. However, varied as are the applications at present, the uses, actual and potential, growing out of war development work have proved that the art of vacuum tube engineering, and the application of its products to radio engineering, telephone and telegraph engineering, and to electrical engineering in general, are still in their early infancy. That vacuum tubes in various forms and sizes will, within a few years, become widely used in every field of electrical development and application is not to be denied.

The engineering advancement accomplished in less than two years represents at least a decade under the normal conditions of peace, and our profession will, it is hoped, profit by this particular salvage of war which offers perhaps the most striking example extant of a minimum "time-lag" between the advanced "firing line" of so-called pure physics, and applied engineering.

The chief signal officer considers that the work of standardization and quantity production of vacuum tubes accomplished during the last eighteen months under the pressure of military necessity, represents an advance in the art of electrical engineering which will prove of inestimable industrial and scientific value to this country, and to the engineering world at large.

## American Signal Battalions in France.

When the chronicles of the great war are written it will become known that the part played by American telegraphers in aiding in the defeat of the Huns was of the same high order as that displayed by the United States military telegraphers during the Civil War, 1861–65, and it is likely that the close personal ties formed by the men of the Signal Corps in the fields of Europe will result in the formation of a veterans' association similar to the Society of the United States Military Telegraph Corps, which is still in existence.

Returning members of the Signal Corps are relating many exciting experiences; accounts which in due time will be woven into a complete history of the part signalers played in the military campaigns.

Company A, 102d Field Signal Battalion, United States Army, formerly Company A, 1st Battalion Signal Corps, N. G. N. Y., had the good fortune to participate in some of the most hotly contested battles in France.

In the severe engagements of September 29 and 30, several of the men of this company were in the thick of the fight and became gas victims. Among these were 1st Class Sergeants Redlafson and Hoey, Corporal Coleman, and 1st Class Privates Everett and Lydamore. Sergeant Redlafson will be remembered as Walter Redlafson, manager of the Postal Telergaph-Cable Company's office at Broadway and 58th street, New York, and Sergeant Hoey is a son of J. E. Hoey, long in the service of the Western Union Telegraph Company at 195 Broadway, New York.

## A Mux-Rake, Perhaps.

The printer chief reported that in the morning he found the machines so littered with tape that it took half an hour to rake it up.

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## NEW IDEAS RELATING TO THE IMPORTANCE OF LINES OF COMMUNICATION.

In a large operating room of one of the telegraph companies a few years ago a visitor noticed that the operators were practically all idle. Inquiring of the chief operator as to the cause of this, the visitor was reminded that the weather was unfavorable. It was raining.

Fortunately the condition here reported was not general, as it is of course true that many years ago telegraph engineers and managers realized the importance of improving the insulation resistance of lines so that communication might be maintained, regardless of weather conditions.

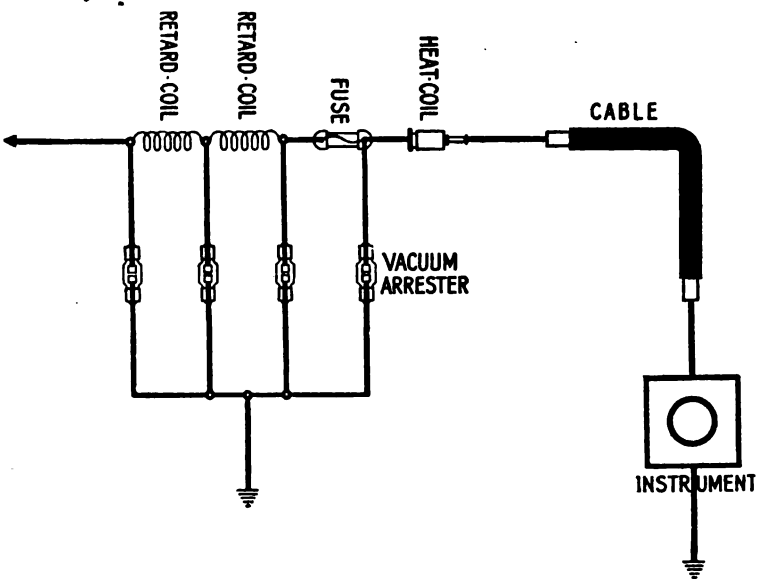
Up to the present time, however, there has hardly been a section of the country immune from service interruption when storms of a certain severity prevailed; storms which occurred annually, and for more or less protracted periods. The line structure was erected and maintained without a high regard for the value of uninterrupted service.

In this respect new light is breaking. A newer and more modern conception now prevails as to the importance of lines of communication which may be depended upon for use, not only during fair weather, but especially during severe storms when other services and facilities which cannot as adequately be safeguarded are disarranged or prostrated. The prostration of mail, express and freight services due to severe storms makes it of particular importance that during these periods continually recurring, telegraph and telephone lines be available as agencies by means of which great losses may be avoided.

A sub-committee of the Association of Railway Telegraph Superintendents has recently made recommendations which, very likely, in the course of time will become practice. These recommendations have in view a type of pole line construction, and a minimum pole spacing, which would constitute a great advance over past and present standards.

Another link in the chain, and which is receiving consideration, is that part of each individual circuit which passes through the lightning and high-tension protective device employed. Most telegraph and telephone engineers can remember the time when lightning arresters were looked upon as somewhat of a nuisance. In estimating the cost of installations, and of communication service, the lightning arrester was not allowed to add much to costs. The unending search seemed to be for a type of lightning arrester which would itself take care of everything that could develop in the way of electrical disturbance, and which would not cost more than a dollar or two per unit.

In this respect also a new light is breaking. Research and experience together have resulted in a more accurate knowledge being disseminated in regard to extraneous electrical disturbances. With a better understanding of the disturbances to be controlled, and a truly economical realization of the values of uninterrupted service, the extent of and the cost of protector equipment required is viewed in a clearer light.




The universal individual unit arrester has not yet arrived, but we have combinations of different types of arrester which accomplish all that is required, and although the initial cost is higher than the figure at one time allotted for this purpose, the continuity of service now possible more than compensates for the additional expense.

As an illustration of progress in the way of combining different types of protectors the accompanying diagram is reproduced to show modern practice in Europe on lines the continuity of which must be safeguarded to the fullest extent. The employment of vacuum arresters in multiple has advantages which will be apparent to the engineer: the possibility of alteration in degree of vacuum is of less consequence when the gaps are duplicated; with the multiple arrangement electrode separation in each unit may be greater, and where several vacuum arresters are used in multiple a defective unit may be detected by observation during disturbances.

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## Government Ownership of Telegraphs.

THE FOLLOWING IS ABSTRACTED FROM AN ADDRESS MADE BY EDWARD REYNOLDS, VICE-PRESIDENT AND GENERAL MANAGER OF THE POSTAL TELEGRAPH-CABLE SYSTEM, AT A LUNCHEON OF THE REPUBLICAN CLUB, NEW YORK, JANUARY 11, 1919:

There is nothing new about government ownership of the telegraphs and there is nothing good about it. It has been urged by both republican and democratic administrations, and is not a party question except so far as it gives advantage to the party that happens to be in power. The motive back of every attempt to bring about government ownership is a selfish one and that is the reason its advocates have failed. There is no merit in the proposition, and public sentiment is opposed to it.

It is not my intention to bore you with statistics on the subject of the operation of the telegraphs in this country and abroad, to support my belief that government ownership and operation of the telegraphs would be a serious mistake. I prefer rather to present to you in simple language the views I hold upon that subject.

The real problem facing us today is not so much whether government ownership is a good thing or not, but, rather, whether the government can seize privately owned telegraph and cable lines without properly paying for them. If that can be done in the case of the telegraphs and the owners of the property have no redress except through the Court of Claims no business is safe. The American people will not stand for strong arm methods. To meet an alleged war emergency, Congress by a joint resolution passed July 16, 1918, gave the President the power to possess, operate and control the wire systems of the country, after the Senate had been assured that passage of the resolution would not be followed by action unless an emergency arose requiring it. An emergency did not appear to exist July 16, and no change in circumstances affecting the telegraphs and telephones occurred, but the lines were six days later taken over. If an emergency did really exist nothing has been done by the government to meet it. Whether the temporary control granted by Congress to meet an emergency is to be made permanent to gratify the personal ambition of the Postmaster General, is yet to be determined. It is my opinion the American people will not permit war conditions to continue after the war is actually over.

This nation has prospered under a constitution that grants to every one the right of free speech, and which has enabled us to maintain a free press. As long as the press is free we need have little fear of socialism, Bolshevism, or any of the other *isms* which foreign nations are facing. A free press, however, is dependent upon a free telegraph, because the telegraph is the medium for the collection and distribution of news. If the telegraph is not kept free from political domination the freedom now enjoyed by the press will be lost. I do not believe I can speak too strongly about the danger of a controlled press if the telegraphs are placed under control of the government, for no matter which party is in power it will be impossible to eliminate the question of politics from their control. As a practical telegraph man I want to say to you, gentlemen, that an absolute censorship can be and will be maintained over private telegrams if the telegraphs are placed under political control—and I do not care what anybody says to the contrary. I know the possibilities.

In political campaigns the telegraphs are used by the campaign committees freely, and the plans, policies and instructions to local committees go by wire. Their privacy has never yet been violated under private management. In the heat of a political campaign under government management the party in control would have the power and opportunity to censor the telegrams of the committees of the opposing party. Do we wish to make such a thing possible?

There is no listening in on the telegraph wires under private management and I do not know of a single instance in our service where there has been what is called a "leak." We have had to resist demands by valued customers and by public officials, but we have steadfastly refused to produce a telegram except under due process of law, and then very reluctantly, and only so far as we were compelled to do it. We believe it is our duty to protect the privacy of messages filed with us by our patrons, and that it is also a good business practice to protect them. Under private or governmental monopoly it would not be necessary to consider the question from a business standpoint, and whether your messages are treated in confidence or not, would depend upon expediency—if that is the right word.

The telegraph differs from every other public utility in that it is not used by the great majority of the people—and it is the great majority that should decide this question, and not self-seeking politicians of any political faith.

Over seventy per cent. of the entire telegraph business of the United States originates in about forty of the principal commercial cities, and the best information we have on the subject shows that about ninety per cent of the population in this country do not use the telegraphs. It is not, therefore, essential to the happiness and well-being of all the people, as the post office, public schools and water supply are, and if operated by the government at a loss—as it surely would be—the loss would have to be paid through taxes and fall upon ninety per cent of the population which do not use the telegraph and could very well get along without it.

The public is not asking the government to take over the telegraphs; in fact, they are opposed to it, and it should not be forced upon them to gratify the ambitions of any man or set of men, or in the interest of any political party. Those who use the telegraphs are willing to pay and should pay for the service they receive.

Under private ownership, and particularly when there is active and aggressive competition, as exists today, every incentive is offered the young man to

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equip himself and strive for advancement. He is given every opportunity to reach the top. That is illustrated by many instances of messenger boys rising to the very top. If you place the operation of the telegraphs under the government you can say good-bye to incentive and individual initiative. The door of opportunity will be closed, and those who enter this field of activity can leave all hope behind.

Competition has been described as the life of trade. It has certainly been the life of the telegraphs. The splendid service given the people of this country by the telegraph is the result of competition, and it is only through competition that the highest standard of service will be achieved and maintained. In this connection I would point out that the American public is being given competition in cities and towns doing four-fifths of all the telegraph business that is done in this country, and if you ask the American public whether there has been competition, and particularly the business man who uses the telegraph, they will tell you decidedly there has been and still is.

The recent statement of the Postmaster General, that he could purchase the private wire companies and pay for them in about twenty years out of the profits, is ridiculous. He does not know what he is talking about when he makes such a statement as that. He may be pardoned, however, because he has had no experience in the telegraph business and knows nothing about it or the influences that bear on its operating costs, and has had no one about him who has had the right experience to furnish him with correct information.

It is the experience of the telegraph companies that their labor cost rises in proportion to the volume of business, and you cannot figure on handling the telegraph traffic at a reduction in the labor cost and maintain the same quality of service by consolidating offices, which is the method the Postmaster General has in mind. It is a delicate machine, and economies in its operation cannot be effected with an axe.

## Red Cross Gets Postal's Hearts and Dollars.

The heart went with the dollar of every executive and employee of the Postal Telegraph-Cable Company answering the Christmas roll call of the American Red Cross. Charles P. Bruch, vice president of the company and chairman of the committee managing the roll call among the Postal's employees, did not paraphrase the roll call slogan in speaking of his subordinates, but the sentiment was clear and there is not the shadow of a doubt that he would stand squarely behind the statement.

Mr. Bruch, when discussing the Postal men and women, is very much the fond parent. He may refrain from boasting about the virtues of his children, but his pride in them shines through the restraint.

"Our people always do the right thing of their own accord," said Mr. Bruch, speaking of the comment sometimes heard, to the effect that employees of large corporations subscribe to charities merely because they are given to understand it is expected of them to do so by headquarters.

"In our company, there has never been the slightest hint from the executive offices to the employees that they were expected to take part in any of the various campaigns we have had in the last year and a half. We believe that participation in any of these should be left entirely to the individual's sympathies, conscience and pocketbook. It is a purely personal matter and the officials would not, in the slightest way, seek to influence their forces.

"When we received the Red Cross letter announcing the roll call," went on Mr. Bruch, reverting to the specific theme of the interview, "we merely notified our people that such a movement was to take place and that the Red Cross invited every one to become a yearly member. We further explained that in order to facilitate enrollment, the Red Cross had asked each company or business to receive the subscriptions of its respective employees who wished to join, and that we had agreed to accommodate the Red Cross in this detail. That is absolutely as far as we went.

"We should be credited with 100 per cent enrollment," said Mr. Bruch, "although the amount of money returned did not equal the approximate number of employees, for I was informed that every manager reported that those under him who did not enroll through our company, explained that they had joined through their church or other organization. But be assured that our people answered the roll call, not through any coercion or even intimation from headquarters, but because they believed, individually and collectively, in the Red Cross."

## Submarine Cable Working.

"Beginner's Manual of Submarine Cable Testing and Working," by G. M. Baines, is a book of 265 pages dealing in a thorough manner with the operation of submarine telegraphs.

The first four chapters contain elementary matter relating to batteries, electrical laws, etc. Chapter V. covers copper resistance of cable, instrumental zero, false zero, theory of false zero test; and in the following eighteen chapters up to date matter is incorporated explaining cable insulation tests, inductive capacity of cables, tests for broken cables, curb transmitter, mouse mill device, recorder adjustment and other matter which should form a part of every cable man's technical knowledge.

The price of the book is $4.50, and copies may be obtained from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

The old wire chief says: "The possession of many talents and poor balance constitute a misfortune, but the misfortune may be overcome by improving the balance."

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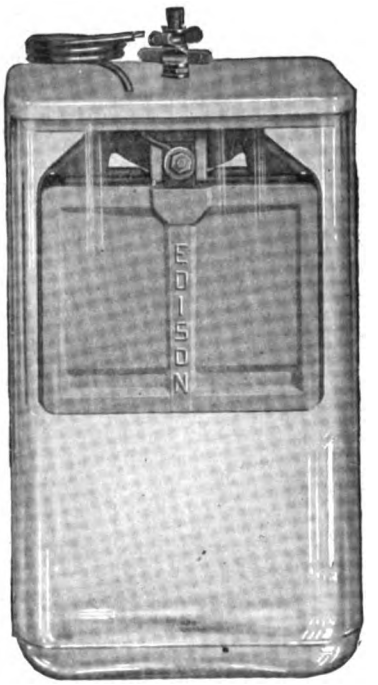
# FOR CLEAR TRANSMISSION

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## THE RAILROAD.

### Association of Railway Telegraph Superintendents.

The Director General of railroads on January 10, 1919, issued Circular 70, stating that during the period of federal control, and in order to provide an administration channel through which recommendations may reach the Director General, the American Railway Association has revised its articles of organization and by-laws and will change its name to the American Railroad Association.

The by-laws have been changed to permit of amalgamating the association's activities with those of the six railroad operating and maintenance associations for many years past conducted by railroad officials of the various departments.

The new organization is to consist of five sections: 1, Operating; 2, Engineering; 3, Mechanical; 4, Traffic; and 5, Transportation. The activities of the railroad telegraph and telephone superintendents will come under the head of operating.

Martin H. Clapp, president of the Association of Railway Telegraph Superintendents, held a meeting in Washington January 30, bringing together the members of the executive committee of the association for a discussion of the conditions likely to follow amalgamation with the American Railroad Association. An account of the action taken will appear in the February 16 issue of TELEGRAPH AND TELEPHONE AGE.

From a telegraph and telephone standpoint it is a little difficult at the outset to discern any material advantage likely to be gained by making the Association of Railway Telegraph Superintendents a part of a larger and general railroad association. The railroad telegraph superintendents necessarily have close operating relations with commercial telegraph officials. Many of the association's recommendations for advancement in practice are the result of joint action with engineers in the commercial service. The conditions here differ from those obtaining in other departments of railroad operation, where all the recommendations are passed upon only by railroad officials.

However, if the new arrangement should prove to have advantages during the period of government control of the railroads it is possible that the plan of one master association of railroad technical organizations will be continued after the return of the railroads to their owners.

### H. A. Shepard,

SUPERINTENDENT OF TELEGRAPH, NEW YORK, NEW HAVEN AND HARTFORD RAILROAD.

As announced in our January 16 issue, Mr. Shepard, effective January 1, became superintendent of telegraph of the New York, New Haven and Hartford Railroad, succeeding N. E. Smith, deceased.

Mr. Shepard learned to telegraph before leaving school, and on December 17, 1897, at eighteen years of age, he entered the service of the New England Telephone and Telegraph Company as helper in a line repair gang. Within a year he became assistant foreman, being advanced to foreman a year later, in which capacity he continued until October 27, 1902, when he entered the service of the New Haven Railroad as combination man under B. A. Kaiser, superintendent of telephones.

On February 1, 1904, Mr. Shepard was appointed inspector, with headquarters at New Haven, Conn. Four years later he was advanced to the position of chief inspector, and on May 15, 1909, received his appointment as assistant superintendent of telegraph of the New Haven system, in which position he continued until his recent advancement to the head of the telegraph and telephone department.

### G. H. Mayer,

SUPERINTENDENT OF TELEGRAPH, MINNEAPOLIS, ST. PAUL AND SAULT STE. MARIE RAILROAD.

G. H. Mayer, on November 1, 1918, became superintendent of telegraph of the Soo Railroad at Stevens Point, Wis., vice P. W. Drew, retired.

In the year 1899, at seventeen years of age, Mr. Mayer began work as groundman in telegraph line work, later entering the telephone business, where he advanced through the various grades of lineman, switchboard installer, and maintenance man. Several years ago he went into electric railway and power work and acquired a valuable fund of information in regard to work of this nature.

In the year 1916 Mr. Mayer entered the service of the Soo Railway as assistant superintendent of telegraph at Stevens Point, Wis., in which position he continued until his recent promotion to superintendent.

R. HOOPER has been appointed superintendent of telegraph of the Kansas City Southern Railroad, vice R. L. Logan, deceased.

### Northern Pacific Railroad Relay Offices.

The following is a list of the chief operators employed in the relay offices of the Northern Pacific Railroad:

ST. PAUL, MINN.—C. W. Smith, manager; J. J. Cavanaugh, assistant; F. E. McAllister, night chief; J. A. Poirier, late night chief.

DICKINSON, N. D.—L. H. Rudiselle, manager; W. J. Servis, assistant; N. DeBree, night chief; B. C. Littlefield, late night chief.

HELENA, MONT.—J. A. Jackson, manager; R. H. Graham, assistant; J. C. Killeen, night chief; L. Adams, late night chief.

SPOKANE, WASH.—V. D. Miller, manager; H. A. Arps, assistant; W. T. Adderly, night chief; R. C. Dobson, late night chief.

TACOMA, WASH.—H. J. Briggs, manager; P. R. Briggs, assistant; J. D. Turner, night chief; R. Mc-

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Donald, late night chief; operators, H. G. Schmidt and W. S. Bates.

PORTLAND, ORE.—E. W. Smith, manager.

### Death of Mrs. A. B. Taylor.

Mrs. A. B. Taylor, wife of A. B. Taylor, superintendent of telegraph, New York Central and Hudson River Railroad, New York, died in Yonkers, N. Y., January 11, 1919. Mrs. Taylor had been in ill health for several months.

## INDUSTRIAL.

IRA J. FRANCIS, who during the past year and a half has been western manager of the John A. Roebling's Sons Company of California, was recently elected president of the company to succeed Squire V. Mooney, deceased.

### Morse Buzzer for Telephone Circuits.

A new and useful telegraph instrument has been brought out by P. B. Delany, the well known electrical engineer of New York, which makes it practicable to use the talking circuit of telephony to transmit over long distances either Morse sounder signals or radio buzzer signals, Morse or Continental alphabets.

There is no electrical connection between the telegraph device and the telephone. The telephone desk set is placed upon a circular wood resonator box the same size as the base of the telephone set. The sending is done by an ordinary Morse key, and by throwing a small switch the signals may be changed from sounder Morse to buzzer.

### Electrical Installations.

In modern telegraph and telephone terminal office installations the demand is for reliable wiring accessories; equipment that will meet all of the requirements of the underwriters' associations, and of standardization committees of the electrical associations.

The product of the Reliable Electric Company of Chicago, manufacturers of sleeves, lightning arresters, fuse contacts and switches, is meeting with a growing sale where dependable accessories are required.

### Old Company in New Field.

KLAXON COMPANY TO MAKE IMPROVED RAILWAY INTERCOMMUNICATION APPARATUS.

An interesting case of industrial development is the entry of the Klaxon Company of Klaxon horn fame, into the railway intercommunication field.

The Klaxon-Stentor loud speaking railway telephones are equipped with these improved transmitters and receivers. They transmit messages in so loud and clear a tone that they can be heard at a distance from the instrument. The railway train dispatcher who has one on his desk need not wear head receivers. His hands are free, and no matter which way his head is turned he can receive and transmit messages distinctly.

### Voltmeter Test for Earth Currents.

In the January 1 issue of TELEGRAPH AND TELEPHONE AGE was given a method of testing the earth potential of a ground contact.

E. W. Miller, chief operator for the Postal Telegraph-Cable Company, Philadelphia, Pa., advises us that in his territory a survey was carried to locate regular test office ground contacts which are at zero potential. It was found that three test offices some distance away from centers, with large electrical distribution systems, have zero earth potential. When periodical tests are made to determine the strength of earth potentials at ground contacts of terminal offices, the line wire is grounded at the distant terminal office and is then passed through the Philadelphia office to one of the country ground contacts with zero potential, and by inserting the voltmeter in this circuit the difference of potential between ground contacts may be noted.

### First Principles of Electricity.

The above is the title of a new book by J. E. Homans, which contains 248 pages of up to date matter relating to elementary electricity and magnetism. In addition to revised matter covering elementary principles the book includes detailed descriptions of electric wiring, alternating currents, polyphase wiring, motors and generators, armature and field windings, synchronous motors, rotary converters, transformers, etc.

Students who have only an elementary knowledge of arithmetic will have no difficulty masterng the subjects covered in this useful work.

The price is $1.25 per copy, and it may be obtained from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

### Telegraph Signals and Vocabularies.

Those who are making a study of telegraph alphabets and cable code vocabularies should possess a copy of the book, "Telegraph Signals and International Code Vocabularies," by James Nicolson. The work contains an analytic study of the various alphabets which have been devised, beginning with Stienheil's, and then taking up Morse's original alphabet, Bain's, Bright's, American Morse and others. The price is $1.00, and copies may be obtained from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

C. E. HARRISON, chief operator of the Western Union Telegraph Company, Jacksonville, Fla., in renewing his subscription, writes:—"I enjoy your magazine above all others, and know that it has been of great value to me in many ways. Please let it come along."

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# EDUCATIONAL.

**In the preparation of the following articles on telephony and radio telegraphy, authoritative works have been drawn on for the substance. The questions at the end of each department are made up independently of the works consulted and are prepared to enable the student to review the lessons. Books from which material is taken are "Radio Telegraphy," a publication by the United States Signal Corps, and "Modern American Telephony." The articles on telegraphy are prepared by the editorial staff.**

## Telegraphy.

### ELECTROMAGNETS.

In the January 16 installment of this series of articles were given formulæ for the winding of electromagnets. There are many considerations worthy of study in connection with the design and construction of electromagnets, and in what follows the student will find valuable data which should be retained in his files for future reference.

The magnetic strength of a magnet is proportional to the ampere turns of its winding. Where low current strength is to be used, in order to obtain the same magnetic strength, a long, thin wire should be used in winding the magnet; for current strengths of an ampere or more the wire used should be thick and relatively short. The cross section of the wire is chosen in proportion to the current strength. The voltage between the ends of the wire forming the winding is inversely proportional to the cross section of the wire.

In most cases the wire windings are put on in even layers the entire length of the core. In telephone receivers, where generally the winding is around the end of the core, the magnetism may be somewhat unsteady, but when so wound the magnetic strength at the core end is raised, permitting of very rapid attraction of the diaphragm.

The magnetic effect of the wire winding decreases with the distance of the wire layers from the core. There is a rule which says that the depth of the winding should be not more than two-fifths that of the diameter of the core but it is good practice to wind coils to a depth of one-half the diameter of the core.

In designing a magnet which is to be used for attracting an armature over a gap of one-quarter inch or more it is well to provide a long core, as this will be required to contain a sufficient amount of wire for the purpose and still observe the "two-fifths" rule.

The area of cross-section of the magnet yoke should be one and one-half to two times that of the core.

With solenoids the attractive force grows in proportion to the ampere turns except where the saturation of the core is low in which case the force grows at a more rapid rate.

Every layer of soft iron has a saturation point; by this is meant that an increase of the current strength after saturation produces only a small increase in the magnetic strength.

In the following installment will be explained what is meant by hysteresis and remanance.

*(To be continued.)*

## Telephony.

### MULTIPLE SWITCHBOARDS.

Multiple switchboards for telephone purposes are built in various sizes. Standard sections are built for an ultimate number, 3,000, 5,400, 10,400, and 18,000 lines. The two smaller sizes are of the six-panel type. The 10,400 line section has eight panels, and the 18,000 line section has ten panels.

For all exchanges with an ultimate capacity of less than 3,000 lines, the standard 3,000 line section is the most suitable. This unit is provided with space for 200 answering jacks and lamps for each of the three operators' positions.

The number of lines that should be handled by one operator depends to a large extent upon local conditions. If the lines are located principally in a business district, sixty lines will keep an operator busy, but when the lines are from residential sections, one operator at the central office can handle from 160 to 200 lines. In cities having but one exchange for all lines the average number of lines to the position usually ranges from 120 to 150.

Where rural lines are to be cared for in the exchange, it is good practice to have them come in on the local board. When this is done the best plan is to have them connected to the second position. The first position should not be used as a regular operator's position, as an operator at this position is not able to reach all the multiple jacks. In equipping a rural position, means must be provided for making connections between rural subscribers, as well as between rural and common battery subscribers. To accomplish this two general plans are used. One is to furnish two types of cord circuits; one for the connection between rural and common battery subscribers and vice versa. The second plan is to use only one type of cord circuit, and have it so arranged as to be suitable for making all kinds of connections. This method is the most convenient from an operating standpoint, as the operator does not need to select the cord to be used for any particular connection thereby saving time. Also, the operator does not require as many cord equipments as where two kinds are necessary. The number of cord equipments for a regular subscriber's position has been generally fixed at fifteen.

In the next installment will be described the

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various lamp signals, answering jacks, keys, etc., used in telephone switchboards.

*(To be continued.)*

QUESTIONS IN TELEPHONY

What are the standard sizes of multiple telephone switchboards?

How many lines does one central office operator generally handle?

How are rural lines taken care of in exchange switchboards?

## Radio Telegraphy.

THE AUDION—HOW IT WORKS.

The vacuum tube is playing such a prominent part in modern radio telegraphy and radio telephony, both as a sending and a receiving device, and in long distance wire telephony as a repeater of talking currents, that it is important that every student of electrical engineering should understand its principles of operation.

In the November 1, 1917, issue of TELEGRAPH AND TELEPHONE AGE appeared a long article, entitled "The Audion Tribe," in which were described the characteristics of the various vacuum tube devices used in radio work. The list of names is a long one and includes such words as dynatron, pliotron, audiotron, Fleming valve, oscillaudion, etc, but the theory of operation of each form of tube is practically the same.

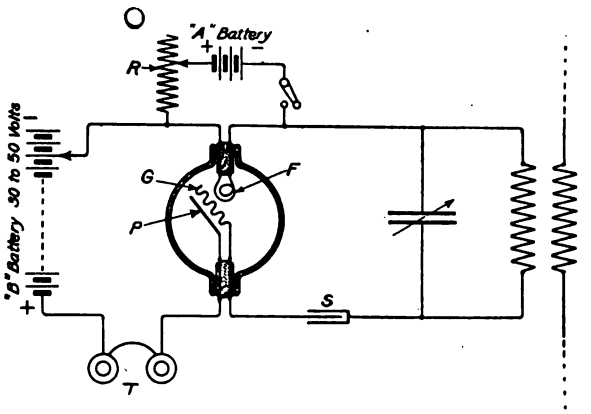
The purpose of the present and succeeding article is to trace the currents developed in the receiving aerial through the elements of the audion and on to the electromagnets of the telephone receivers used to receive the signals.

The accompanying illustration shows a three-element vacuum tube, or audion radio detector. On the right is illustrated the aerial wire extending upward into space and downward to the earth, passing through the primary winding of an air core transformer, usually adjustable.

*S* is a condenser of fixed capacity, about .003 mf., *T* represents the telephone receivers in which the incoming signals may be heard, and the vacuum tube detector is shown in the center; *G* representing the grid, *P* the plate, or wing, and *F* the filament.

Now, then, with the elements of the vacuum tube plainly before us, and its connecting wires all in place as actually employed in service, let us trace the local conditions.

When the small switch of the *A* battery circuit is closed the filament *F* will become incandescent, and immediately a more or less powerful emission of electrons or negative electric charges takes place. The electrons leave the heated filament and at a comparatively low velocity pass through the wire grid and impinge upon the surface of the wing element, or plate *P*. Within the bulb exists an electrical condition called unilateral conductivity, as follows from the transfer of negative electrical charges in a direction from hot filament to cold plate. The rectifying properties of the bulb are here apparent, for negative electricity will flow from the incandescent filament to the grid and plate, but not in the opposite direction.




Further, when the evacuated space between the filament and the plate is charged by the passage of electrons through it a conducting path is created for current from the *B* battery, and it should be noted that this battery has its circuit by way of the telephones.

With the *A* battery switch closed, therefore, current from the *B* battery flows steadily through the telephone receivers across the evacuated space in the bulb. This is entirely irrespective of any incoming radio signals.

In the next installment we shall trace the action upon this local circuit of incoming electromagnetic waves used in radio signaling.

*(To be continued.)*

## Shop Talk.

BY THE OBSERVER.

I have tried to show that there is no royal road to knowledge, and any one who has sought for a short cut leading to a panacea has wasted valuable time and is nearer a field yielding only fruit of despair and indecision, which will produce such a spirit of unrest and discouragement that to turn

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back and forget that knowledge was in quest seems like the only haven. To avoid such a snare, let us think of what Browning said:

"Oh, if we draw a circle premature,
Heedless of far gain,
Greedy for quick return of profit, sure
Bad is our bargain."

Many will say that they have not had the advantage of a college education, and cannot hope to understand the things which are written by men of great learning. That is a mistaken idea, which I hope to prove. There is nothing which enters into telegraphy or telephony in any of its branches that cannot be handled within the area of such intellectual philosophy as is inscribed within a high school course. Now, foreign languages, differential and integral calculus, and a few other "high-brows" which are part of a college degree are to telegraph and telephone engineering what the box is to the cigars. The box maintains the cigars, but we can have cigars without the box, and we can have our electrical course without any knowledge of the "high-brows." To all I would say, whether you have a degree or not, read the book entitled, "The Utility of All Kinds of Higher Schooling," by R. T. Crane, and you will see some things that will cheer up your moanings and pinings, and many parents that read that book will be better prepared as to Johnnie's future days of schooling. Do not think that I am disparaging a college education—far from it, but listen to what Spencer says: "The remark is trite that in his shop, or in his office, in managing his estate or his family, in playing his part as director of a bank, or railway, he (the college graduate) is little aided by this knowledge he took so many years to acquire, so little that generally the greater part of it drops out of memory."

All know that we forget much of what we learn, that it escapes us, unless we have some place to hide it. There is but one place to hide it, and that is on paper, keeping the same as a reference library. Now, as that is true, and as a high school education will enable one to read and understand all the papers of the course in question, why worry about a college degree? It is quite true that some memorize a greater portion of such things than others, but as that part belongs to psychology, I will not attempt to discuss it, except to say, the best engineers are not always those that possess the greatest vocabulary, or retentive memories, but those are the best who apply the best things in practice at the proper time. Such is the aim of the course of the Western Union-American Correspondence School, and such is the purpose of trade journals devoted to special vocations. I have often been approached by persons connected with testing and regulating departments, asking about some of the simplest applications of Ohm's law, whereas at that very time the present issue of TELEGRAPH AND TELEPHONE AGE had the precise information therein that the inquirer was after. After showing the party how to secure the results, a few questions brought out the fact that he never subscribed to the AGE, never read Jones', McNicol's, or Maver's books, the four best telegraph mediums in the world, and yet such people seem to be satisfied to plod along. They cannot be satisfied. They are starving for intellectual food and must sooner or later partake thereof, or become afflicted with the infirmity of incompetence.

*(To be continued.)*

## GOOD VIBROPLEX SENDING.

The bulletin board in the main operating room, Postal Telegraph-Cable Company, Philadelphia, Pa., contains some pithy bulletins bearing upon the art of first class vibroplex sending. That these bulletins are read and taken seriously by the operators is evidenced by the fact that Philadelphia telegraphers have a national reputation as expert senders.

Some of these bulletins are herewith reproduced:

"Straggly sending, without regard for spacing, marks the inexperienced operator. 'He sends perfect Morse' are words that express a whole lot when referring to a telegrapher."

"The swing and rhythm of perfect machine sending is like music to the ear of the listener or receiver, and on the tape shows up clean cut, perfectly spaced."

"Sending-machine users should not be satisfied with their sending until they have mastered a steady, rhythmic style, free from any combinations—a style that can be copied by any receiver with perfect ease. Examine your sending frequently for any signs of faults."

"Sometimes an operator's ability is hampered by a sending machine or typewriter that is out of adjustment or that needs oiling. It is impossible to give too much attention to this. Machines that are regularly cleaned and oiled seldom go back on us."

"Put all your character into your machine sending; good sending is music to the ear, but wild, excited, unspaced sending is discordant and indicates in the sender a careless disregard of proficiency. A sending machine is mastered by handling it slowly at first until perfection is acquired."

"Practically all the ragged machine sending that is noticed on some circuits is due to machines being geared too high. To become a competent machine sender it is first necessary to master a slow speed, then gradually increase it. Control is everything, and a machine under control will deliver the goods."

"Have you any 'combinations' in your machine sending that ought to be eliminated? Slow down on them; keep at it intelligently until they are removed and the sending is perfect. You know from experience how unsatisfactory it is to try to copy from a machine sender whose combinations you have to pick out."

### Just What Did He Send?

"It is a great tix if you don't wotkf."

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## Efficiency Engineering.

*(Continued from page 41, January 16 issue.)*

In previous chapters we had something to say on the integrity that is necessary in the makeup of efficiency in its broadest scope. It was stated that a man must be rated at A-1 in paying his bills if he wished to stand well in the community in which he lived. It is just as important that an individual should guarantee his services to his employing interests. This means that he should and must render a *quid pro quo* for the amount he receives in wages. Most everyone has occasionally heard the remark of an employee to the effect that "the company is rich, and if I can get away with a few extra privileges to which I am not entitled, no one is the wiser." This is the wrong spirit, and sooner or later it will bring a man to grief.

When a man applies for a position he guarantees his services. He says what he can do and he is particular to state that what he does he does well, so that no fault can possibly be found with his work which, he invariably says, will be well performed in every instance. In many cases when the individual feels that he has been in the service of the company long enough to be regarded as one of the foundation stones of the institution, he then begins to take advantage of the confidences bestowed in him, which results sometimes in the loss of his position. When you guarantee your services be sure it is a guarantee that will last indefinitely. Never have it said that the guarantee was only intended to secure employment.

A writer states that the great war was won by specialists in destruction. Efficiency was worked to perfection in efforts to destroy. Now that the war is over, peace calls for specialists in construction and production. What has been destroyed must be replaced as speedily as possible; and the work of reconstruction requires as thorough training as the trade of war. The trained man is bound to win. A good motto to follow in this connection would be to declare that your services will not only be guaranteed as satisfactory, but your employers will have no cause for disappointment at having appointed you to a position of trust, and permit us to say right here that all positions are those of trust. The messenger boy who carries the important telegrams from the office to a customer holds a position of trust, and he should be taught to so regard it. The receiving or delivery clerks handle telegrams of importance, and their positions are those of trust. The operators who transmit the messages over the wires hold positions of trust. The officals of all companies are likewise judged to be holding positions of trust. Therefore where shall we draw the line? What positions in the telegraph service are the least important? Some may say the messenger boys receive the smallest wages and they are the least important. Are they? We think not. Every position in the telegraph or telephone service is important and one of trust, or it would not exist. In these days of efficiency corporations demand a better grade of intelligence. They feel that the positions they have to fill demand this class of service and they employ those only who guarantee their service, and their guarantee must be made good. We have already mentioned that the war is now over. Hundreds of thousands of soldiers are now competing for positions. Does anyone doubt that the best posted and most efficient of these soldiers will receive first consideration? No doubt from now on for a long time to come the basis for employment and promotion is going to be: "Who is best fitted for the work?"

Does anyone doubt that in the course of time all railroad systems in the United States will be electrified? Who is preparing to do this work? Who should prepare to carry out a project of this magnitude? Why, those already schooled in electricity. The telegraph ranks have furnished most of the electrical engineers in all previous great undertakings and the electrification of railroads will not be an exception to the rule. We would urge students generally to prepare for this gigantic task. It is coming and it is coming fast. This, together with the expansion of the telegraph and telephone systems that is always taking place, means that men of efficiency will be required and those who do not prepare to meet this condition stand in their own light. Our readers possess at least one half of the electrical education that is necessary to make them successful electrical engineers. Are they going to allow the opportunity to pass without securing the additional knowledge, and thus become efficient? We hope not. It is an opportunity that seldom knocks at the door of the average man. Who is there that can afford to disregard the call? Be prepared to meet all exigencies that may arise.

*(To be continued.)*

## Electricity and Magnetism.

A First Book of Electricity and Magnetism, by W. P. Maycock, is a work which constitutes a thorough course in elementary electrical engineering. The book is pocket size and contains 350 pages, covering in an instructive manner all of the principles concerned in the design and operation of electrical instruments. One especially valuable feature of the book is a section on electrical experiments which enables the student to develop and prove the theories discussed throughout the text of the work.

The price of the book is $1.25, and copies may be purchased from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

The old wire chief says: "The operator who says 'Good morning' to those he meets when he enters the office, makes a good start in the day's work."

The old wire chief says: "The lineman who fixes the weak spots only when breaks occur generally has plenty of fixing."

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## COSTON AND VERY SIGNAL HISTORY.

The death at Chestnut Hill, Mass., on January 3, of Rear Admiral Samuel Very, at the age of seventy-two, recalls an interesting incident in American naval history when boat-to-boat signaling systems were first introduced.

In her autobiography written in the year 1886, Martha J. Coston, widow of B. F. Coston, the inventor of the Coston signals, says:

"Meanwhile a Lieutenant Very applied for a patent on this same improvement, which he called his own, but was refused, one only being granted him for a certain sort of cartridge. Nevertheless, through the influence of Commodore Ammen and Captain Walker, his successor, this form of signals, called the Aerial, has been adopted by the United States navy and is known as the Very signal.

"Naturally enough this caused me great concern and annoyance, especially as the adoption of the so-called Very signals was proclaimed in the newspapers, having emanated in the Navy Department, and accompanied by disparaging and erroneous remarks on the Coston signals.

"Finally, my son William, to set the public right, sent the following communication to the press; it appearing in a number of prominent journals, including the New York *Tribune* of July 11, 1879, which read as follows:

THE COSTON MARINE SIGNALS.

"The proprietors of the Coston signals, in reply to a Washington dispatch of July 8, relating to the contemplated substitution of the Very signal lights in place of the Coston night signals, state that the description of the latter given in the dispatch, and the statements that they have been condemned both by the proprietors of the patent and the chief signal officer of the Navy Department, are erroneous. The Coston signals, and the signals described in the account referred to as Coston signals, are not the same. The Navy Department in attempting various alterations and improvements of the Coston signals, has caused the invention to deteriorate. The Coston signals as furnished to the merchant marine and used in the life saving and revenue services, are not liable to deteriorate in any way by long storage, hot climates, or dampness. The Navy Department is itself to be blamed in the matter, and is accountable to the public for allowing an invention which was purchased at the public expense to become worthless. No effort has been made by the department to acquire the improvements which have been made since the conclusion of the late war. The proprietors of the Coston patents furnished the night signals to the United States navy through the war, and of twelve million signals used not one was returned as damaged."

B. Franklin Coston was a chemist and was stationed at the Washington navy yard in the year 1846. He died a year or two later at the age of twenty-two, and before he had had time to place upon the market his system of night signals.

Ten years later while Coston's widow attended the celebration in New York of the laying of the first Atlantic cable, she witnessed the pyrotechnic display in City Hall Park when "Roman candles and showers of colored lights" turned night into day as the city paid its homage to Cyrus W. Field.

The appearance of the colored lights suggested to Mrs. Coston that in New York she might find a manufacturer with a shop equipped to take up the manufacture of the Coston night signals. In this she was successful, and within a few years thereafter the Coston signals were used by practically every navy in the world and are in use to the present day.

Samuel Very was born in England in 1846, but came to the United States and enlisted in the navy at the beginning of the Civil War. He was commissioned a lieutenant in 1870.

## THE "O O" COLUMN.

### Temporarily.

"Temporarily" is the way the sender says he sent it, but the receiver's first guess made it read "Tell P. O'Reilly."

### Did Not Know the Code.

A young operator temporarily assigned to copy press matter turned out his first message, "Senator Brown arrived dirty at four P. M." The sender was using Phillips' Code and intended the letter d to be copied as "in the" and after that the word "city," making the dispatch read, "Senator Brown arrived in the city at four P. M."

### Selling Rendered Swing.

When the hat jobber received a message reading "Swing your hats at three dollars, is this O. K.?" he perhaps had a vision of great excitement.

### Suggested for the Telegraph Menu.

boiled beeswax, magnet cores, leg boards, and Ohm

Hot filaments, lightning bugs, ham sandwiches, slaw.

### Check Off.

If the check is 24-paid and you can find only 20, what is missing? Mere words! Mere words!

### Conundrum.

Why is an engineer who uses formulæ with Greek letters, like a hungry messenger boy?

Because he can always Eta Beta Pi.

### 'Tis All Too True.

If the man on the 1st Milwaukee earns two dollars per day bonus, and the breweries close up and business drops off, would you call that "bone dry"?

### Add Code.

An International News Service operator wants to know if "pep" is Phillips' code for pepper.

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## COMMUNICATION.

P. B. DELANY OF THE TELEPOST COMPANY, NEW YORK, COMMENTS UPON THE PRESENT TELEGRAPHIC SITUATION.

EDITOR TELEGRAPH AND TELEPHONE AGE:

SIR—Exigencies of war have brought about radical disturbances in management and methods of travel, transportation, correspondence and electric communication, placing all arbitrarily under government control for duration of the war and, as it turns out, afterwards for a more or less indefinite time.

Now that fighting has stopped, those who want their properties back claim the war is over, while the government seems disposed to wait for official declaration of peace before letting go—if then. Railway stockholders appear to be less anxious for return of the roads than are the high salaried officials. The share owners are better satisfied with a government guaranteed dividend than one of uncertain amount or possibly a New Haven catastrophe.

This same feeling seems to prevail among shareholders, big and little, of the Western Union, while the large holders of the Postal spurn the basis of income allotted to that company by the Postmaster General. Mr. Burleson claims the appraisement was based on the company's own returns to various state and tax commissions. However this may be, the Postal is out strongly against government ownership, while the Western Union and the Bell Telephone are encouraging it all they can with inducements of newly discovered improvements for amplification of wire capacity, such as five separate conversations, or forty telegraph messages simultaneously over a wire, the results of years of concentrated efforts of scores of experts, etc.

In just one fleeting allusion has credit been given to the real author of the method upon which these extensions of facilities are based, Major General Squier, who explained the theory in a paper read before the Society of Electrical Engineers, London, about three years ago.

The claims made for the telephone may be all right, but, so far, forty messages telegraphically is somewhat in the nature of a Missouri proposition.

Seventy-two messages were simultaneously transmitted over a wire between Boston and Providence thirty-three years ago *at a speed* of about three words per minute for each of seventy-two synchronized circuits.

Simultaneity in this instance was in the sense that seventy-two printers were in turn, put in connection with the line at each revolution of a contact arm over that number of segments in a circuit table, the arm making three revolutions per second. By grouping the segments so as to give two to a printing instrument, thirty-six messages could be transmitted in the same way at double the speed, and so on, to the limit of the printing instrument's actuation, which was reached in the apportionment of four circuit segments or twelve contacts with the line per second. Obviously these divisions of the wire were not economical, but by arranging the contact segment into groups of twelve for Morse, working thirty-six contacts per second for each instrument yielded six first class circuits. This system was used successfully over English lines for fifteen years.

Admitting the possible prematureness of criticism of the new system in absence of full information, ample warrant is, however, afforded by the statement of the acting engineer in chief of the Bell Telephone Company to the effect that the apparatus is so costly to install it would be cheaper to furnish separate wires for distances of one hundred miles, and that no reduction of rates need be expected for at least many years, as a result of this discovery. When a few weeks ago announcement of an apparently very important and proven improvement in radio telegraphy was made, high Western Union authorities sought to belittle it as a stock selling move. Now some others may be pardoned for harboring the suspicion that this executively boomed, but technically refrigerated discovery in telephony and telegraphy may be for furtherance of government ownership.

Never since the beginning of telegraphy has there been so much perplexity as to what is going to happen. Will it be government ownership, or company ownership with government control? It seems to be a fair inference that the telegraph business will never fall back into the old routine rut. The government seems determined to bring about quicker mail service, and for this purpose to avail of every medium and vehicle of speed—trains, tubes, airplanes and telegraphy. It is realized that correspondence facilities have long been slow and inadequate.

In the mind of a telegraphist the telegraph must be the final mail carrier.

Whether under government ownership or private ownership with government control does not matter, so long as the work is efficiently performed, and at reasonable rates.

The writer is strongly of opinion that an electric mail at moderate cost is not possible by the Morse or any other electromagnetic system.

The Morse has always been and will continue to be indispensable for stock and other Exchange business where transactions are made in a quarter of a minute or less. As compared to various printing telegraphs, including the latest developments, the writer sees no reason for qualifying in the slightest degree the claims made by him several years ago that the best printing telegraph was a polar duplexed wire manned by four first class Morse operators using typewriting machines for receivers. Wire for wire, message for message, minute for minute, and dollar for dollar, this combination cannot be equalled by any multiplexed or phantomed printing system. No matter what happens, the Morse cannot be dispensed with.

Of course, when it comes to transmission of a great volume of correspondence the Morse would be wholly inadequate as would also be all other electro-

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magnetic systems, especially printing systems operating over synchronously distributed circuits, or over so-called "phantom" circuits. Fine balancing, multiplicity of moving parts and critical adjustments by experts to meet constant atmospheric changes form the antithesis of a practical electric mail organization. In Europe, owing to these delicate and intricate complications, it has been found necessary to provide metallic circuits (two wires) underground for their operation, so susceptible are they to induction effects from other wires and leakage from power circuits.

With the electro chemical fast automatic system alone is it possible to establish an electric mail of adequate carrying capacity over a minimum number of wires and at rates which will attract ordinary letter correspondence?

The chemical recording system has no electromagnets, no movable parts, except the tape pulling motor, no delicate adjustments. It transmits signals up to the physical capacity of a wire, and records messages in plain Morse dots and dashes on a tape at from five hundred to one thousand words a minute. Over an ordinary overhead telegraph or telephone wire. or superposed on a telephone circuit, this system will keep thirty to forty typewriters busy printing messages, each typewriter being the equivalent of the fastest printing circuit without the instability of complicated printing mechanism operated from a distance through intricate subdivisions or derivations of a wire's carrying capacity, two-thirds of which is necessarily wasted in inherently incidental operations.

This Telepost system can deliver to any point within one thousand miles ten fifty-word letters for every mile covered by an airplane starting for the same objective. The first ten letters would be at their destination before the airplane could fairly start and so on to the end of a ten hour journey, assuming the airplane meets with no mishap, as it sometimes does. PATRICK B. DELANY.

South Orange, N. J.

## Midwinter Convention of the American Institute of Electrical Engineers.

The midwinter convention of the American Institute of Electrical Engineers is to be held at Institute headquarters, New York, February 19, 20, and 21.

The afternoon session, February 21, has been assigned to the Telegraphy and Telephony Committee, Donald McNicol, chairman.

At this session a paper on "Aero Telephony" by Messrs. E. B. Craft and E. H. Colpitts, a paper on "Theory of Transient Oscillations" by John R. Carson and a paper on "Telephone Circuits With Zero Induction" by W. M. Crawford, are to be presented.

The committee has in hand a number of other important telephone, telegraph, and radio papers which will be presented at later meetings of the Institute.

## Serial Building Loan and Savings Institution.

The sixty-eighth semi-annual statement of this institution, issued as of December 31, 1918, shows that the Serial now has assets above one and one-quarter million dollars. The statement shows further that telegraph and telephone workers have invested $201,768.08 in installment shares, $636,-032.73 in savings accounts, and $333,337.28 in income certificates, all of which pay five per cent. interest to the investors.

At the annual meeting, held January 21, the officers elected for the ensuing year are: President, Thomas M. Brennan; vice president, James F. Nathan; secretary, Edwin F. Howell; Directors—Thomas M. Brennan, Edwin F. Howell, C. G. Ross, P. J. Casey, A. O. Wallis, W. J. Quinn, T. W. Carroll, E. P. Tully, G. W. Blanchard, N. M. Giffen, J. F. Maguire, Charles Jacobson, C. A. Kilfoyle and E. F. Howell, Jr.; advisory board—F. W. Lienau, F. E. d'Humy, Lewis Dresdner, S. B. Haig, M. C. Allen, John A. Hill, J. R. Hyland, C. B. McCann, Thomas E. Fleming, Edward Reynolds, Chas. P. Bruch, James R. Beard, Thompson E. Hall, D. Skelton, J. B. Taltavall, M. W. Rayens, E. F. Cummings and M. Quinlan.

## Bound Volumes of "Telegraph and Telephone Age" for 1918 Now Ready.

We now have ready for delivery bound volumes of TELEGRAPH AND TELEPHONE AGE for the year 1918. These volumes are bound in serviceable cloth covers with the magazine title and year on the back.

The twenty-four issues of TELEGRAPH AND TELEPHONE AGE for the year 1918 contain a large amount of technical matter relating to telegraphy, telephony, radio telegraphy and submarine cables, as well as a complete chronological report of the progress of government control of telegraphs and telephones. No technical library is complete without a copy of this book. The price for the complete year is $4.00, carrying charges 50 cents extra.

Address orders to TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

## Electrical Instrument Making for Amateurs.

The above is the title of a book by S. R. Bottone, now in its eighth edition, which was written for the amateur experimenter who desires to learn electrical engineering principles by making electrical devices with his own hands. There are 272 pages and ninety-six illustrations, and detailed descriptions are given of how to make condensers, Leyden jars, induction coils, electroscopes, Tesla coils, magneto armatures, thermopiles, elementary wireless telegraph apparatus and many other pieces of electrical apparatus. The instructions are so simple that only inexpensive tools are required in making the instruments described.

The book sells for $1.35, and copies may be purchased from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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## WESTERN TELEGRAPH COMPANY ANNUAL MEETING.

### Cable Company Plans to Meet Competition of American Companies in South America. Experiences of Company's Stations During the War.

Sir J. Denison Pender, presiding at the annual meeting in London of the Western Telegraph Company, December 4, last, incorporated in his report a statement setting forth the situation now presented in South American countries in regard to competitive lines of cable communication.

As foreshadowed at the last meeting, the company had now been granted a concession by the Brazilian government to lay a submarine cable from Rio de Janeiro to the Island of Ascension, where it would join their other cables landing at that island; also they had secured a concession to lay a cable from North Brazil to the Island of Barbados. The length of these new lines together would be considerably over 3,000 nautical miles, and would entail an expenditure of many hundreds of thousands of pounds. Furthermore, since war was declared it had been impossible to carry out renewals to the several existing sections which were now urgently in need of renovation, proved by the constant interruptions to which they were subject. These renewals had to be suspended over the last four years, and time had shown the necessity of resuming this work at once, in spite of the high prices which at present prevailed for cables. They were also threatened with further competition; the Western Union Telegraph Company had secured a concession to lay cables between various ports from the north to the south of Brazil, thus making another communication between Brazil and the United States. The Central and South American Telegraph Company, which for many years past had owned cables and land lines from the United States to the Argentine, had also obtained a decree from Brazil sanctioning the laying of two cables to the River Plata, one from Rio de Janeiro and the other from Santos. These cables would connect that company's existing system at Buenos Aires with its lines serving Chile, Peru, Central and, finally, North America. They were also advised that a few weeks ago a concession for a submarine cable from Rio de Janeiro to Cuba had been granted to an American citizen, but as yet they had no further particulars with regard to this. The necessary steps were being taken by their legal advisers to protect this company's interests where this proposed competition was considered to affect those interests and their concessions. In July last at a meeting of a wireless company the chairman stated that an eminent authority in the United States had expressed to him the opinion that no long distance cables would ever again be laid, and that, in his view, wireless telegraphy was thoroughly efficient for all telegraphic purposes. This opinion was evidently not shared by North American cable companies, as was proved by the efforts they were making to lay new submarine cables over a distance of many thousands of miles, entailing an expenditure of close upon, if not over, £2,000,000. The directors had, however, no fear but that they would be able to hold their own in the future as in the past, but what he had told them furnished another reason for maintaining the strong financial position in which the company stood at the present time.

CABLE STATION BOMBARDED BY GERMAN VESSEL.

Referring to the experiences of the company's cable stations while the activities of the German navy lasted, the chairman stated that twice during the war one of the islands where they had a cable station was bombarded by an enemy submarine. The company's buildings were particularly aimed at, but on the first attack no damage was caused. On the second occasion a shell severely damaged a church facing their station, and splinters penetrated the staff quarters, going through the floor and ceiling of two rooms which fortunately were unoccupied at the time. Several people were killed and wounded, but no member of the staff or their families were among the number. At another island where the company's office was also close to the sea an enemy submarine appeared actually in the harbor and did considerable damage to shipping, but no bombardment of the town took place. The staff throughout remained cool and resourceful. Arrangements had been made in 1914, after the war broke out, for the maintenance of communication, even if their buildings here or abroad had been wrecked. The staff, seniors and juniors, at home and at their foreign stations, had had no easy time during the last four and a half years.

### The Drawing of Plans and Diagrams.

An excellent book on the subject of engineering drawing is Engineer Draughtsmen's Work, a pocket size book of ninety-six pages which describes the use of drawing instruments; how to do sketching, designing, leveling and surveying; how to handle drawing paper, blue prints and tracings. The book also contains suggestions for the branches of scientific knowledge advisable to be studied by draughtsmen.

The price of the book is $1.00, and copies may be purchased from TELEGRAPH AND TELEPHONE AGE, 253 Brodway, New York.

### Book on Alternating Currents.

Arithmetic of Alternating Currents, is the name of a new book by E. H. Crapper. For those who are familiar with elementary mathematics, this book will be found valuable as it describes in a thorough manner periodic and alternating currents; generation of alternating electromotive forces; inductances; inductive circuits; capacity and condensers; resistance, inductance and capacity in parallel; static transformers; induction motors and transformation of currents.

The book contains 208 pages. Price $1.25. Copies may be purchased from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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### Radio Communication for President Wilson en Route on His Peace Mission From the United States to Brest, France.

President Wilson was in constant communication with the United States and France during his entire voyage from the United States to France through the U. S. S. Pennsylvania's powerful radio transmitting and receiving sets. The Annapolis high power transmitting station, transmitting on 16,900 meters, the high power transmitting set at New Brunswick, N. J., transmitting on 13,000 meters, the high power transmitting set at Tuckerton, N. J., on 9,200 meters and the high power transmitting radio station in Lyons, France, on 15,500 meters were used for communications to and from the President.

The President on board the U. S. S. George Washington was convoyed by the U. S. S. Pennsylvania (which is the best equipped ship afloat for signaling purposes in regard to radio communications) and five topedo boat destroyers. The Pennsylvania's radio equipment consisted of the following apparatus: One 30 kilowat Federal Arc Transmitter which was used for transmitting messages to the United States and France on 3,600 meters, one 10 kilowat Lowenstein Spark Transmitter, transmitting on 600 and 952 meters which was used for intermediate communication with low power coastal stations, one short range radio telephone transmitter, transmitting on 297 meters and one vacuum tube short range transmitting set, transmitting on 450 meters which were used for intercommunication between the U. S. S. Pennsylvania and the U. S. S. George Washington.

The Pennsylvania transmitted messages direct to the United States up to a distance of 2,500 miles. Communications with Lyons Station, France, was established long before the Pennsylvania was beyond communication range of the United States.

The Pennsylvania has six receiving booths which were able to receive on eight different tunes simultaneously as follows: One booth guarded Annapolis or New Brunswick tunes 16,900-13,000 meters, one booth guarded Lyons tunes 15,500 meters, one booth guarded Tuckerton's tune 9,200 meters, one booth guarded 4,000 meters (the Standard Arc Calling Tune), one booth guarded 450 meters for the U. S. S. George Washington vacuum tube transmitter tune and one booth guarded 297 meters (the Radio telephone tune). One additional operator guarded 600 and 952.

The radio stations at Otter Cliffs, Maine, and Lyons, France, were used to receive messages from the President, transmitted by the U. S. S. Pennsylvania's Arc.

The George Washington's radio equipment consisted of the following: One low power spark transmitting set, one 16,900 long wave receiving set, one short wave 600 meter spark receiving set, one short range radio telpehone transmitting and receiving set, one vacuum tube 450 meter transmitting and receiving set. The U. S. S. George Washington was able to intercept messages transmitted by the Annapolis or New Brunswick stations and guard 600 meter (commercial calling, and emergency tune and the radio telephone and vacuum tunes) simultaneously. Messages for the President transmitted from the United States by the Annapolis, New Brunswick, Tuckerton and the Lyons stations were received by the U. S. S. Pennsylvania and relayed to the George Washington by means of a radio telephone and vacuum tubes transmitting sets simultaneously.

The messages from the President destined to the United States or France were sent from the George Washington to the Pennsylvania by the vacuum tube or radio telephone set and were relayed by the Pennsylvania's high power arc transmitter direct to the United States, Lyons or Brest, France.

The radio communication was directed by Commander H. W. McCormack, U. S. N., Fleet Radio Officer. Lieutenant S. V. Edwards is in charge of the radio of the Pennsylvania.

### Train Dispatchers' Vacations.

Supplement 10 to Circular 28 of the Northwestern regional director amplifies previous instructions regarding time off and vacations for yardmasters and dispatchers. It is the intention that two days off per month be granted for the purpose of providing needed rest, and definite arrangements must be made to carry out this provision in the current month. Whenever, due to extremely bad weather or any other emergency, the two days' relief is not granted during the month, extra pay will be allowed at prorata rates. It is not intended that train dispatchers be required to make trips over the line on their days off. Two weeks' vacation per annum with pay will be allowed those officers who have served in that capacity continuously one year or more. On roads where more favorable vacation rules or practices are in effect they will be continued. This vacation provision is compulsory and must be provided at the convenience of the officer in charge.

### The Ticker as a Testing Device.

In a paper read by M. Gondet, before the French Physical Society, mention was made of the possible use of the ticker employed in wireless telegraphy, the function of which is to produce interruptions of current of a frequency capable of producing a musical note. A ticker of this type, used in conjunction with a telephone, could be employed in practice, instead of a galvanometer, as a convenient means of detecting small continuous currents of the order of one microampere upwards. A sketch is given of a Wheatstone bridge arrangement using the ticker and telephone which is recommended for industrial work.

J. LEVIN, late general superintendent, Western Union Telegraph Company, Atlanta, Ga., and one of our valued subscribers, writes that he "takes great pleasure in reading the numerous well-directed articles contained in TELEGRAPH AND TELEPHONE AGE. It also enables me to keep in touch with my former associates."

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## OBITUARY.

F. G. JONES, for several years in the service of the Western Union Telegraph Company at Jacksonville, Fla., but during the past few years in the service of the Postal Telegraph-Cable Company at Philadelphia, Pa., died in the latter city December 18, 1918.

JOHN MILTON FAIR, aged sixty years, died at Essex, Ont., January 1, after a long illness. In 1881 Mr. Fair entered the service of the Western Union Telegraph Company in the Detroit, Mich., office, and in later years served as manager at Saginaw, Mich., and Grand Rapids, Mich. About five years ago Mr. Fair at his own request was transferred to the Detroit office, where he remained until 1916, at that time retiring on pension. Superintendent E. Boening, of Detroit, and other officials of the company, speak very highly of Mr. Fair's qualities as a gentleman and as an associate in business.

JOHN FRANZEN, fifty-eight years of age, for twenty-two years operator in the service of the Associated Press at Meriden, Conn., died in that city January 20.

BEN H. LING, manager of the Western Union office at Salem, Ore., died January 9, at the age of thirty-three years.

DANIEL V. FERRIS, aged eighty years, formerly chief operator for the Western Union Telegraph Company at Syracuse, N. Y., died January 18 at Buffalo, N. Y. Mr. Ferris was a member of the United States Military Telegraph Corps during the Civil War.

CAPTAIN JAMES VANCE BIGGERT, assistant quartermaster, United States Army, died January 9, at Jeffersonville, Ind. Captain Biggert was a member of the United States Military Telegraph Corps during the Civil War.

NATHANIEL HUCKER, for many years traffic chief in the Buffalo office of the Postal Telegraph-Cable Company, died January 2, at the age of eighty-seven. Mr. Hucker entered the service at Buffalo in 1847. and had been identified with the telegraphs of that city to the day of his death. For many years he was chief operator for the Western Union Telegraph Company. An extended biographical sketch of Mr. Hucker appeared in a recent issue of this journal.

### Death of Ralph A. Black.

As announced briefly in our January 1 issue, Ralph A. Black, late manager in Philadelphia for the Western Union Telegraph Company, died in that city November 28.

Mr. Black's friends throughout the service were shocked to learn of his untimely end—he was but thirty-eight years old at the time of his death.

Writing from Philadelphia, William P. Greene, long an associate of Mr. Black, says:

"Back in 1893, when but a little chap thirteen years of age, Ralph Black started on the bottom round of the ladder of our company as a messenger at West Chester, Pa., and in his ascent verified the fundamental fact that promotion and success are based on diligence, ability and merit. His grasp of the requirements of the telegraph business in its every detail was early recognized, and advancement to more responsible positions followed. He was first promoted to the managership of West Chester, then in succession to Media, Lancaster, Cape May and York. From York to Philadelphia as assistant manager, thence to the general manager's office as inspector were but further steps. By this time his sterling qualities had proven that notwithstanding his paucity of years he had in him the power of leadership, and in July, 1910, he was appointed manager at Philadelphia. As we all know vast strides have been made in the art of telegraphy during the last twenty-five years, in all of which our company has taken a leading part. As a result business grew by leaps and bounds, taxing the resources, not only of our facilities, but of our executives as well. Mr. Black kept the Western Union in the forefront during this period, continually busied with the details of the work, mingling with the leaders of business, associating himself with all who could advance the interests of that which he had closest to heart, the Western Union Telegraph Company. His activities were not confined to this alone, however. As a vestryman of his church his counsel and advice assisted in bridging many obstacles, his tender interest in a day nursery brought happiness to many children, the consideration and thoughtfulness evidenced in his association with his employees as individuals endeared him to all."

ASSESSMENT No. 651 has been levied by the Telegraph and Telephone Life Insurance Association to meet the claims arising from the deaths of John Lapey, at Buffalo, N. Y.; A. C. Murphy, at Milwaukee, Wis.; W. L. Darbee, at Saugerties, N. Y.

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# Telegraph and Telephone Age

No. 4 NEW YORK, FEBRUARY 16, 1919 Thirty-seventh Year

## Telegraph and Telephone Age

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NEW YORK, FEBRUARY 16, 1919.

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### Technical Progress in Electrical Communication.

During the past few years we have not heard so much as formerly about the electric telegraph remaining "where Professor Morse left it," and he would indeed be a careless observer who has not learned something about the progress that is being made in the allied arts of electric communication: telegraphy, telephony and radio.

Sometimes the rate of development seems lacking in big steps forward, and it is only when we pause in a retrospective sense to view what has been accomplished that we realize that measurable, forward steps have been taken.

In telegraphy, the present high state of development of printing telegraph systems, while known in its fulness only to those who handle the traffic in large offices, marks a point in progress which forms a sharp contrast with the telegraph of Morse's time. Two-channel, four-channel and eight-channel printing telegraph systems operated at typewriter speeds over long distances, perform service that, in efficiency, is far in advance of that prevalent when Buffalo messages originating at New York were relayed by hand at Albany.

It is true that the Morse alphabet is still widely used in transmitting telegrams, but by means of semi-automatic transmitters of the vibroplex type, of typewriters, and highly perfected Morse duplex systems the number of telegrams handled per hour has grown from twenty or thirty to as high as 110 in that period. Telegraph duplex systems using but two milliamperes current are now in use on underground cable circuits. Telegrams now are passing in both directions over circuits at the same time being used for telephoning; late improvements making five telephone conversations and two telegraph circuits practicable with but two wires.

The electrical equipment of recently installed telegraph offices bears only outline resemblance to the equipment in use at a period no more remote than twenty years ago.

In submarine cable signaling the speed of operation has within the past few years been very greatly increased, and signals are now automatically relayed between adjoining long sections of cable where a few years ago hand retransmission was the common practice.

Radio telegraphy so long the darling of the amateur laboratory, has within the past five years made greater progress than during the previous sixteen years of its existence. The advent of the great war which at first threatened a setback for radio expansion, in reality gave this, the youngest of the tele-arts, an opportunity to meet special conditions which, as it turned out, its sponsors were fully capable of improving.

The application of the recently perfected radio telephone to the needs of aeroplane signaling was one of the most effective and most revolutionizing agencies placed at the service of our fighters in the war areas.

In his lecture delivered on January 10, before the American Institute of Electrical Engineers, Major-General Squier, chief signal officer of the United States army said:

"The advancement accomplished in less than two years represents at least a decade under the normal conditions of peace, and our profession will, it is hoped, profit by this particular salvage of war which offers perhaps the most striking example extant of a minimum "time-lag" between the advanced firing line of so-called pure physics and applied engineering."

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# CURRENT EVENTS

## Executive Office Announcements, Personal Mention, Appointments

### PERSONAL.

JAMES FRASER, executive engineer in the service of the British Post Office Telegraphs, has been awarded the 1914 Star for services in France during the first few months of the war. Shortly after the war started Mr. Fraser was sent to France to establish an undulator telegraph circuit between an office in France and an office in England. The necessity for this emergency circuit arose at the time the French government had to leave Paris hurriedly. The granting of the Star to a civilian is very exceptional.

W. P. S. HAWK, for many years superintendent for the Postal Telegraph-Cable Company at Salt Lake City and at Chicago, has for several years past been in the service of the Marconi Wireless Telegraph Company at Honolulu, T. H., acting as representative in the various local government matters incident to navy control of radio stations, and also has had charge of the contract department of the Mutual Telephone Company's automatic plant in Honolulu.

AMONG THE PROMINENT old time telegraph people now sojourning at Miami, Fla., are Mr. and Mrs. C. H. Bristol of New York, Mr. and Mrs. I. N. Miller of Cincinnati and Mr. and Mrs. P. W. Drew of Chicago.

### POSTAL TELEGRAPH-CABLE COMPANY.

EXECUTIVE OFFICES.

EDWARD REYNOLDS, vice-president and general manager of the Postal Telegraph-Cable System has returned to his office from an extended business trip.

THE COMPANY has opened an office in the new Pennsylvania Hotel, New York, with Mrs. Moore, formerly operator in the Hotel Belmont office, in charge. At night the office is in charge of Miss Koehler, formerly of the Hotel Knickerbocker office.

MANAGERS APPOINTED: F. G. Lyons, Atchison, Kan.; Julia Hofmeir, Edwardsville, Ill.; Mrs. C. J. Hortsmann, New Brighton, Pa.; C. W. Kendrick, Waynesboro, Ga.; Mrs. B. C. Coffin, Newburyport, Mass.; J. C. Winnickie, Durant, Okla.; J. H. Kennington, Cheyenne, Wyo.; M. Cooper, Las Animas, Colo.; Mrs. L. H. Lee, Pelham, Ga.; E. G. Hardgrove, Barberton, Ohio; J. Stransky, Chicago (Bx branch); F. M. Rainier, Chicago (Hs branch); L. M. Bowlus, Chicago (C branch.)

B. D. SEYMOUR, for several years general quad chief in the main office, Chicago, has purchased a fine agricultural property a short distance from Windsor, Ont., and is devoting his time to its development.

MRS. R. E. JOHNSON, has been appointed manager of the office at Dover, Del., vice W. J. Burt, transferred to the main office, Philadelphia.

### WESTERN UNION TELEGRAPH CO.

EXECUTIVE OFFICES.

REPORTS FOR AUGUST, SEPTEMBER AND OCTOBER, and the period from January 1, 1918 to October 20, 1918, contain the following figures showing gross and net operating revenue, and operating income, Western Union Telegraph Company:

| | |
|---|---|
| For August— | |
| Operating revenue | $ 7,403,000 |
| Net operating revenue | 1,216,000 |
| Operating income | 898,000 |
| For September— | |
| Operating revenue | 7,352,000 |
| Net operating revenue | 1,344,000 |
| Operating income | 996,000 |
| For October— | |
| Operating revenue | 8,202,000 |
| Net operating revenue | 1,989,000 |
| Operating income | 1,545,000 |
| From Jan. 1, 1918, to Oct. 31, 1918— | |
| Operating revenue | 71,782,000 |
| Net operating revenue | 15,456,000 |
| Operating income | 12,149,000 |

W. J. BLENHEIM, traffic manager of the Western Union Cable System, has returned from Europe where he has spent some time in the interests of the service.

J. P. EDWARDS, division traffic superintendent, and C. H. Drake, assistant to the division traffic engineer, both of Chicago, were executive office visitors recently.

S. L. BURT, division traffic superintendent, and H. A. Smith, division traffic engineer, both of Atlanta, Ga., were business visitors at the executive offices during the last week of January.

J. W. COLLINS, district supervisor of equipment, Philadelphia, was a New York business visitor February 7.

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THE COMPANY has leased for twenty years the seven story Masonic building in Dallas, Tex, which in its entirety will be occupied as a telegraph headquarters. The building is modern in construction and was erected four years ago. The work of remodeling and installation of equipment will be begun in a few months, the sixth and seventh floors being allotted for the operating department.

I. N. MILLER, retired district commercial superintendent of the Western Union Telegraph Company, is spending the winter at his home 227 Capbell Street, Miami, Fla. Mr. Miller intends returning to Cincinnati, Ohio, May 1, next.

## New York Western Union.

THE FIRST ENTERTAINMENT AND DANCE of the Western Union Educational Society, for the season of 1919, was held on the evening of February 7, on the eleventh floor, 24 Walker Street. The society's own musicians rendered vocal and instrumental selections and provided music for dancing. These entertainments are always a success and are well attended. Similar entertainments are to be given once each month during the season.

HARRY MCKELDIN, of the Washington, D. C., office was a recent visitor in New York.

MATTHEW SCANLON, formerely an operator in this office, but for several years past on the pension list, died January 19.

LADIES IN TOWN: Margaret, daughter of W. S. Wood, division supervisor of equipment, Chicago; and Anita, daughter of H. W. Petrie, of the plant department, New York.

## Chicago Western Union.

UNDER THE AUSPICES of the Patriotic and Protective League of this office, A. J. Fuller, general assistant chief operator, addressed a meeting of employees January 13, on the subject of organizing a new society to be known as the Western Union Educational and Social Society. The purpose of the society to be is to bring together on common ground department official heads and employees of the company in this city for the discussion of all subjects pertaining to the management of the business and the working conditions governing the disposition of the staff. Mr. Fuller stated that it is desired that the employees be given an opportunity to familiarize themselves with the work of all departments. Classes will be organized along special lines and it is proposed to organize a relief fund to aid deserving cases.

JOHN W. KONIGSMARK, of the division plant department, who has been in St. Anthony's hospital, this city, during the past six weeks, is recovering his health and is expected soon to be back on duty.

THE CHICAGO TELEGRAPHERS' AID SOCIETY held its thirtieth annual meeting Sunday January 26, the following officers being elected for the coming year: John P. Kelly, president; J. M. Powers, vice-president; A. E. Wilder, secretary; R. S. Gill, treasurer. Executive committee: J. J. Harrington and Florence Reilly, of the Postal Telegraph-Cable Company; C. F. Mallon, representing the railroad telegraphers; A. J. Fuller, E. F. Wach, A. L. Ewing and Miss Ellen Croke representing Western Union telegraphers.

## J. E. Mifka, Chief Operator, San Francisco.

Joseph Edward Mifka, recently appointed chief operator, main office Western Union Telegraph Company, San Francisco, has progressed from operator to chief operator of a large office in a period of less than nine years.

Mr. Mifka was born at Kewaunee, Wis., March 19, 1886, and entered the service of the Chicago, Burlington and Quincy Railroad in 1903. From 1903 until 1910 he was employed at various points on that road as operator and as train dispatcher.

In 1910 he entered the service of the Western Union Company at San Francisco as operator. Since that time he has served as supervisor in the Morse department, supervisor of automatics, traffic chief, assistant chief operator in the multiplex department, traffic chief, night chief operator, and now as chief operator of San Francisco office.

## William J. Fleming's Jubilee.

At Charleston, S. C., on January 19, William J. Fleming, of the Western Union Telegraph Company, celebrated his fiftieth year in the telegraph business. Mr. Fleming entered the service of the company as messenger when he was thirteen years of age. Within two years thereafter he had become a first class operator, and after a few years' experience in New York and other large telegraph centers he returned to Charleston, where in the year 1881 he was appointed manager of the Charleston cotton exchange office. As manager of that office during the past thirty-eight years Mr. Fleming established a high reputation as a telegraph manager, and his wide acquaintance with brokers and other business men in the south has been a valuable asset to the Western Union Company.

On the occasion of his fiftieth anniversary in the service Mr. Fleming received many testimonials of friendship, both from his telegraphic associates and from the company's patrons. The Charleston *American* of January 19 reproduced Mr. Fleming's photograph and gave a two column account of his connection with the telegraph.

## Some Sort of an Elevator, Perhaps.

The message read: "Ship large stair pump to Omaha at once," but the original copy made a more modest request and asked that they "ship largest air pump to Omaha at once."

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## THE CABLE.

THE GUAM-MANILA AND MANILA-HONGKONG cables are repaired. Cable communication with the Philippines, Hongkong, China, and Siberia via Commercial Pacific Cable is restored.

CABLEGRAMS of a domestic or personal nature may now be accepted for places in Luxemburg at sender's risk. Business cablegrams are not allowed for the present. Only plain language, English or French, may be used.

### Cable Staff Changes.

The following staff transfers have taken place in the service of the Pacific Cable Board: I. M. Blue and C. F. Rankin, from Auckland to Suva; L. J. Gibbes and A. H. S. Barrack, from Suva to Auckland; R. C. Kennedy, from Sydney to Southport; J. H. P. Blackley, from Southport to Sydney; W. J. C. Lather, from Southport to Suva; J. E. Dicketts, from Auckland to Halifax; G. Blackshaw, from Sydney to Fanning Island; Alfred Smith and E. R. Saffery, from Bamfield to Auckland; F. E. Noad from Bamfield to Melbourne; L. Cosgrove, from Norfolk Island to Bamfield; R. C. Phippard from Fanning Island to Bamfield, and H. K. Balcombe from Vancouver to Montreal.

Changes in the staff of the Western Telegraph Company are: E. L. Gooch, from Rio de Janeiro to Pacific and European Telegraph Company, and A. Pearce, from Rio de Janeiro to Santos.

In the service of the Eastern Extension Telegraph Company, the following staff transfers have taken place: T. W. Shanahan, from Darwin to Adelaide; E. G. B. Dunkerley, from Chefoo to Darwin, and W. M. Black, from Banjoewangie to Singapore.

## THE TELEPHONE.

MATT B. JONES has been elected president of the New England Telephone and Telegraph Company, to succeed Colonel Philip L. Spalding, who resigned to enter the Boston banking firm of Eastabrook and Company. Mr. Jones assumed his new duties February 1. He has been connected with the telephone organization for more than twenty years and, as first vice president, for more than a year past directed the affairs of the company during Colonel Spalding's absence on military service.

W. R. MC GOVERN, since 1911 chief engineer of the Chicago Telephone Company, and chief engineer of the central group of Bell Telephone Companies, with headquarters at Chicago, has been appointed general manager of the Wisconsin Telephone Company, succeeding H. O. Seymour, resigned.

HARRY V. LAWRENCE, of the commercial department of the New England Telephone and Telegraph Company, Boston, is believed to have the only personal card and autograph in America of Marshal Foch. He recently sent a scrapbook to the general, containing hundreds of articles about him that had been clipped from American newspapers, and the general acknowledged it in his own writing.

G. A. NANCARROW, who during the past three and a half years has been chief testboard man in the service of the American Telephone and Telegraph Company, at Indianapolis, has been in the service of that company nine years. Prior to entering the service of the American Telephone and Telegraph Company, Mr. Nancarrow had several years' experience as repeater man and wire chief in the commercial telegraph service and in the telegraph service of large western railroads.

B. H. TIDRICK, has been appointed assistant chief testboard man at Fort Wayne, Ind., in the office of the American Telephone and Telegraph Company.

S. A. JACKSON, formerly chief testboard man for the American Telephone and Telegraph Company at Detroit, and later occupying a similar position at Beaver Dam, Ohio, and who has been on sick leave at his home at Pleasant City, Ohio, for the past year, is now reported on the road to recovery.

## RADIO TELEGRAPHY.

### MARCONI NOTES.

W. A. WINTERBOTTOM has been appointed traffic manager of the Marconi Company, with headquarters at New York, vice G. S. DeSousa elected treasurer.

CAPTAIN VYVYAN, of the British Air Service and formerly a Marconi engineer, who has been in this country several weeks recuperating from gas attacks, has returned to England.

G. E. HENDERSON, superintendent of the Gulf Division, was a recent New York visitor.

COLONEL CLARENCE C. CULVER, of Washington, is given chief credit by the War Department for the invention of the new wireless telephone which has enabled allied airmen to give information and receive instructions from the ground while flying at considerable distances from their bases. A headpiece like that worn by telephone operators is worn beneath the airman's helmet. A movable speaking tube is constantly near his mouth. Wires from these pieces connect with a battery which gets its power from the airplane motor. Culver was assisted in his invention work by E. J. Simon, an electrical engineer.

### Institute of Radio Engineers.

The Institute of Radio Engineers held a meeting February 5 in the rooms of the engineering societies' building, New York. A paper was read by Roy E. Thompson on the subject, "The Uni-Control Receiver." The development and construction of this important and practical form of single control radio receiver was described and illustrated.

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### Wireless Litigation.

When the United States government actively entered the great world war several wireless suits were about ready for trial before the courts. The trial of the patent infringement suit brought by the Marconi Wireless Telegraph Company against the De Forest Radio Telephone and Telegraph Company, which was to have commenced on June 12, 1918, in the New York Federal District Court, was at the request of the navy department suspended by Judge Mayer for the duration of the war. Also, at the request of the navy department, litigation in the United States Circuit Court of Appeals in San Francisco, involving the Marconi Wireless Telegraph Company's patents was, in June, 1918, suspended for the duration of the war. At the request of Attorney Samuel Knight, representing the Marconi Company, and Hiram Johnson, Jr., appearing for the Kilbourne and Clark Manufacturing Company, which Marconi charges with infringement of patents, the cases were taken from the calendar. Two days, May 22 and 23, 1918, had been set aside by the Circuit Court judges for hearing arguments in the cases. The government now is using the Marconi patents.

## CANADIAN NOTES.

T. W. MOLSON has been elected a director of the Montreal Telegraph Company, taking the place of Bartlett McLennan, deceased.

THE GOVERNMENT of the Dominion of Canada has relaxed certain restrictions on the use of radio telegraphy at sea, to Canadian vessels through Canadian stations. Messages in plain language on ships' business, or from the general public may now be sent to, or received from, Canadian vessels through any regular Canadian commercial raido telegraph station on the east coast, Great Lakes, west coast, and Newfoundland at any time, except through the naval stations at Halifax, N. S., and Sable Island, which will only handle ships' business in plain language. Canadian ships are also permitted to exchange plain language commercial traffic on the Pacific on any part, and on the Atlantic west of 40 degrees west, which latter is subject to British restrictions, limiting the traffic to ships' business in plain language. The trans-Atlantic wireless between Glace Bay, N. S., and Clifden, Ireland, has been reopened, but traffic is limited to press messages and government business until further notice.

C. L. LEIGHTY, formerly superintendent at Toronto of the Canadian Pacific Railway Company's Telegraph, is now connected with the operating department of the Railway Company, at Smiths Falls, Ont.

AS NOTED in our January 16 issue, George A. Watson is commissioner of the Manitoba government telephone system, with offices at Winnipeg, Man. Mr. Watson has been in his present position since August 16, 1912.

JAMES A. COLLIE, telegrapher in the employ of the Canadian Pacific Railway Company's Telegraph, since 1886, died January 19, at Montreal.

### Pan-American Telegraph Notes.

BRAZIL.—The concession recently granted for the laying of a submarine cable between Rio de Janeiro and the Island of Cuba was taken out in the name of Frank Carney.

COLUMBIA.—The government has granted to the Marconi Wireless Telegraph Company of America the exclusive privilege for a period of ten years of manufacturing, using, selling, or exploiting in the Republic its wireless telegraph improvements and processes.

GUATEMALA.—A national telegraph school has been established in the city of Guatemala, in a new building erected for this purpose.

HAITI.—A high-power radio telegraph station is being erected on Bon Air Hill near Port au Prince, by the United States navy department. The towers already completed are 500 feet high.

NICARAGUA.—A telegraph and telephone line is being constructed between Cape Gracias a Dios, Rama, and other towns and villages along the Atlantic coast, and will be ready for service in the near future.

### Lieutenant Colonel William L. Hallahan Awarded the D. S. C.

The medal of the British Distinguished Service Order has been awarded to Lieutenant Colonel William L. Hallahan, chief signal officer of the Twenty-seventh Division, by Marshal Haig.

Colonel Hallahan went over as the chief signal officer of the twenty-seventh division, with the rank of major. During the entire time of the division's operation against the enemy he was chief signal officer and was promoted to the grade of lieutenant colonel because of his efficient service.

He was with the division when it was cited by Field Marshal Haig for its brilliant support of the Fourth British Army. The division advanced more than ten miles and took more than 6,000 prisoners between September 27 and October 20, and was cited by General Pershing.

Colonel Hallahan was one of three officers in the entire division whose services were recognized by the awarding of the British Distinguished Service Order.

### A Wagon Load of Potatoes.

Operator on Premium Circuit: "Why are the messages on this wire like a wagon load of potatoes on a rough road?"

Traffic Chief: "Give it up. Why?"

Operator: "Because the big ones are always on top."

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## PROGRESS OF GOVERNMENT CONTROL OF THE TELEGRAPHS AND CABLES.

As announced briefly in the February 1 issue of TELEGRAPH AND TELEPHONE AGE, the House Committee on Post Offices and Post Roads on January 28, approved and reported to congress a resolution limiting federal control of telegraphs and telephones to December 21, 1919.

Various dates for the termination of control of the telephone and telegraph companies were suggested after the committee had concluded its hearings on the original administration measure by examining Postmaster-General Burleson. The first proposal was for restoration of the properties to private management next May 30, but this and another to extend the time to December 31, 1920, were voted down.

As introduced by Chairman Moon, the resolution authorized the Portmaster-General to negotiate contracts for the purchase of telephone companies and to have an appraisement made on the telegraph properties, but those provisions were stricken out by the committee. Mr. Burleson and other proponents of the legislation insisted that the purpose was to extend the period of control and not to bring about government ownership.

On the final vote as announced by the committee three Democrats joined with seven Republicans to end the period of control on December 31 and seven Democrats and one Prohibitionist opposed it, and they desired extension for a longer period.

Mr. Burleson favored a longer period of government control than next December 20, a date suggested while he was before the committee. He said "the danger" would be that congress would have been in session but a month and declared that he regarded the question as one of the greatest importance because manufacturers and others must have "proper service" in order to develop their business. The Postmaster-General declared that if he wished to insure government ownership he would turn back the systems at once, but added that he thought the "interest of the business men should be looked after."

### THE POSTAL'S POSITION.

Clarence H. Mackay, president of the Postal Telegraph-Cable Company, on January 31, addressed a letter to members of congress, in which he urged that there has been no reason advanced for the government retaining control of the telegraph and cable lines, and urging congress to vote their immediate return to the companies.

Mr. Mackay further said that the public wishes telegraph competition restored. The government is losing money daily on its guaranteed compensation to the Western Union, he says, and it should be stopped summarily. The extension of time from the proclamation of peace to December 31, would be unconstitutional, Mr. Mackay claims.

Incidentally Mr. Mackay criticizes the taking over of the telephones and raising of rates by Postmaster General Burleson. His statement, in part, follows:

"I realize and respect the responsibilities of the members of congress, and as an American citizen and president of the Postal Telegraph-Cable Company and the Commercial Cable Company, I would earnestly request that you consider carefully the proposed joint resolution which has been reported to the House of Representatives by the Committee on Post Offices and Post Roads, extending to December 31, 1919, the control of the Postmaster General to cover the telegraphs and telephones.

"The companies of which I am president are fully capable of conducting their business and financing their present needs and future extensions without any increase in rates. If the Post Office Department should order an increase in rates (and we believe an increase in rates is unjustifiable at this time) we shall put those rates into effect under protest and shall allow them to continue only during the time of government control. In my judgment the lines should be turned back to the owners immediately, as it is not pleasing or conducive to good management to have our business controlled as it is today by orders of the Postmaster General given through our competitors in business."

### MR. VAIL'S VIEWS.

Theodore N. Vail, president of the American Telephone and Telegraph Company, who was called upon by Postmaster General Burleson to act in an advisory capacity in matters pertaining to government control of the wire systems, believes that at the present time—

"There is without doubt an opportunity for a great piece of beneficial and constructive work by combining and coordinating all the various existing utility services, or those that are complementary and supplementary, into one or more well balanced systems, the extent of which should be determined by the nature of the service, by the extent of the service rendered, and by commercial, geographic, economic reasons; and by combining in a direct manner, and as far as possible divorced from political or partisan or class influence, the requisite power and authority of the federal government expressed in a mandate to equilibrate revenue, operating costs and capital charges, with an operating organization, adopted to the requirements of the service, and based on the methods which experience, enterprise and operation in the industrial world have shown to be effective, efficient and economical."

### CABLES SEIZURE LITIGATION.

The case of the Commercial Cable Company against the Postmaster General, testing the constitutionality of the action of Mr. Burleson in taking over the property of the submarine cable companies after fighting in Europe had ceased, was advanced by the Supreme Court of the United States for hearing on March 3.

### A Mux Man Wants to Know.

A mux supervisor wants to now if it would not be particularly appropriate should the wire case be tried in one of the circuit courts.

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# Approved Interior Wiring Methods.

## How to Wire Offices for Electric Light So That the Work Will Pass Inspection.

By John H. Mayer, New York.

In fitting up new telegraph offices or rewiring old offices, the wiring for electric light is, as a general thing, done under direction of the engineering department, but there are many instances where the office manager, chief operator, or station lineman finds it necessary to do work of this nature without assistance or advice from headquarters.

The purpose of this paper is to outline briefly the requirements of approved electric light wiring for offices and to present methods of doing the work which may be of value to those who have had no previous experience in electric light wiring.

In the case of buildings carrying fire insurance, or where such insurance is desired, electric light and power wiring is required to conform with the rules of the electrical code of the National Board of Fire Underwriters, an association of fire insurance companies.

Compliance with the code is now required also by many municipal governments, and by public service companies in cases where fire insurance is not carried.

The electrical code consists of a set of rules and regulations governing the manner in which electrical work shall be done and the nature of the materials to be used, and is based upon experience and observation as to what is best in any given case.

The National Board of Fire Underwriters maintains laboratories for the purpose of testing all kinds of electrical material and appliances which may be submitted by manufacturers, to determine whether or not such materials and appliances meet the standards established by the board. Lists of approved materials and fittings may be procured upon request at the local office of the board in practically every city and town in the country. Fire insurance agents also are glad to aid in procuring copies of the current issue of the code.

### PROCEDURE TO BE FOLLOWED.

When a complete wiring job is to be done, application for inspection of the work is filled out on a prescribed form furnished by the underwriters. This is filed with the underwriters' inspector of the district where the work is to be done. If the work when finished meets with the approval of the inspector he issues a certificate of approval, after which the service company is free, upon request, to supply electric current to the premises.

In some localities the municipal authorities insist upon an inspection of all extensions and changes made in previously completed installations as well as of installations which are entirely new.

The procedure here described may seem somewhat involved in red tape, but in fact the requirements are based solely upon the necessities of the case; the aim being simply to minimize fire losses due to improper or careless workmanship, and to the employment of fittings and materials that will not withstand the wear and tear of service. In some places the municipal authorities require that the workmen doing the wiring must possess a license issued by the local electrical bureau and based upon the workman's competency as an electrician.

### SERVICE CONNECTION.

The electric service company usually extends its lines to a point just inside the building line of the premises occupied, from which point the wiring must be continued by the tenant. The approved arrangement of interior circuits is then as follows: Double-pole or three-pole cutout (fuse holding device) or fused switch to be mounted at a point as near as possible to where the service mains enter the building, for the purpose of cutting off the service from the building if desired for any reason, and to protect the wiring beyond that point from overload. When the meter is mounted at the point where the mains enter the building the protective cutout equipment is sometimes included as a part of the meter outfit.

The first stage of the interior wiring is from the point of entry to a switchboard, distribution panel, or to a branch cutout block. The extent of the wiring necessary here depends upon the location decided upon for the switchboard or cutout. Where a large number of lamps is involved a switchboard, distribution panel and cutout block are used. In medium sized installations panel or distributing board including fuses and switches in their make up are used, and in small installations branch cutout blocks with or without switches are used.

### BRANCH CIRCUITS.

Those parts of the system to which the fixtures, drops, and attachments are connected are known as branch circuits. The wiring system must be so planned with regard to branch circuits that there will be one cutout for each 660 watts of electric load, and the number of sockets and receptacles to a circuit from each cutout is limited to a total of thirteen, regardless of their arrangement, grouped or otherwise, even when the load is less than 660 watts.

The smallest size wire permissible in branch circuits is No. 14 B. and S. gage. The size of the wire used in any other part of the system depends upon the total current to be carried by that part. Fixture wire, drop cords, and attachment cords must not be smaller than No. 18 B. and S. gage copper.

Beyond the point where the underwriters' requirements are satisfied the character of the wiring to be done depends upon: 1, Whether the job is new throughout, or an extension; 2, nature of the service to be given; 3, character of the building and conditions under which wiring has to be done; 4, authorized expenditure for the job; 5, desired finish and appearance.

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Interior electric light wiring is of two general classes, exposed and concealed. These are subdivided into other classes. Exposed wiring consists of open wiring done on glass or porcelain insulators; metal conduit work; armored cable work; wood and metal molding work. Concealed wiring consists of metal conduit work; armored cable work; flexible tubing, and knob and tube work.

Open wiring done on knobs or cleats has the advantage of being cheaper and more accessible than other classes of exposed work, but in appearance is not so neat, and cannot be employed where pipes or similar obstructions are present or where conductors are likely to be disturbed. In this class of work rubber-covered single-braid (R. C. S. B.), slow-burning (S. B.), slow-burning weather-proof (S. B. W. P.), or weather-proof (W. P.) wires are used, depending, respectively, on whether the work is done in a place where the surroundings are dry or damp, hot, hot and damp, or very damp. S. B. W. P. wire may be used where R. C. S. B. wire is permissible.

METAL CONDUIT WORK.

Metal conduit is of two kinds, rigid, and flexible. Rigid conduit is similar to gas pipe made smooth inside and given an approved coating inside and outside to protect it from rust or corrosion. It is made in ten-feet lengths, and in standard pipe sizes ranging from one-half inch diameter upward. Rigid conduit makes the most durable job for both exposed and concealed work, but the initial cost is higher than when other materials are used.

Flexible metal conduit may be obtained in sizes corresponding to iron pipe sizes. With both rigid and flexible conduit the wire used is rubber-covered double-braid (R. C. D. B.). The conduit is first fixed in position and then the wires are pulled in.

Armored cable used for both exposed and concealed work is similar to flexible conduit except that the wires are included at the time of manufacture. It is particularly useful in the concealed wiring of old frame buildings. Its chief advantage over rigid conduit is that, like flexible conduit, a continuous length may be used between outlets requiring less cutting, and no threading or assembling. When used in damp places it must have a lead covering over the wires and under the armor.

MOLDING.

Wood molding makes a neater job than all other classes of exposed wiring, with the possible exception of metal molding. Wood molding is easier to install and is less expensive than metal, but it is not fireproof, and for this reason its use is prohibited by the municipal authorities in some places. In both kinds of molding R. C. S. B. wire must be used.

NON-METALLIC TUBING.

A non-metallic, flexible tubing is sometimes used for concealed wiring of frame buildings, the tubing being cut long enough to reach from outlet to outlet, and the wires pulled into it. Both are then pulled into place together, R. C. S. B. wire being used. The chief advantage of this class of work is its inexpensiveness.

KNOB AND TUBE WORK.

Knob and tube work, used in concealed wiring of frame buildings, consists of running wires on porcelain knobs between beams and using tubes to carry the wires through the beams. Non-metallic, flexible tubing is sometimes used in conjunction with knobs and tubes to wire around difficult positions, R. C. S. B. wire is used.

While cheaper to install, as a rule, no class of cleat, knob, tube, or non-metallic tubing wiring makes as durable or safe a job as does fireproof conduit or armored cable, and for this reason the various types of installation of these classes here described are less used today than in the past, even where permissible.

APPROVED MATERIAL.

With all branches and classes of the work approved fittings and material must be used. Inasmuch as practically all work done in this country has to comply with the requirements of the National Electrical Code, it does not pay manufacturers to produce anything that will not measure up to the requirements of the Code. Consequently, little difficulty is experienced in procuring approved material and fittings. The catalogs of electrical supply houses, as well as the sales staffs, are a great help in determining what material or fitting is best in a given case.

A full realization of the fire risk, interruptions to service, etc., resulting from careless workmanship, makes for care in execution of every detail of the work, and this minimizes the probability of trouble from these causes.

## Society of the United States Military Telegraph Corps.

The annual report of the United States Military Telegraph Corps for the year 1918 has been published in booklet form by the secretary of the society, David Homer Bates.

The report shows that during the past two years $2,149.27 has been disbursed in carrying on the affairs of the society, which includes the cost of the reunion banquet given in September 1916, and the 56th anniversary Carnegie souvenir, issued in April 1917. A copy of the souvenir brochure, bound de luxe, was delivered to Mr. Carnegie in the presence of Mrs. Carnegie and Miss Margaret Carnegie, on May 4, 1917, the remembrance being received with expressions of marked pleasure and appreciation.

The report states that since the last previous meeting of the society thirty-one deaths have taken place among the members. The total membership of the society now consists of 487 names; one founder, three life members, 194 veterans, one auxiliary and 288 sons and grandsons of veterans. All of the veterans with the exception of fourteen have received their certificates of honorable service under the act of congress approved by President Cleveland, January 26, 1879.

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## TELEGRAPHY AS A HANDICRAFT.

**John Lee, of the British Government Telegraphs, the well known author, telegraph economist and devotee of art, recently presented a very interesting paper before the London Telegraph and Telephone Society, entitled "Telegraphy as a Handicraft," from which we quote the following passages:**

"It may be that to make work pleasant is to undermine the very foundation of life. At least it is generally assumed that work is a penalty, a burden, a hateful necessity. The sweat of one's brow is a sort of mark of Cain. Had it not been for sorrowful happenings in the early days of our race we might not have had to work at all. But as we have to work there is something to be said for making it as little disagreeable as we can. The psychology of craftsmanship is the art of finding personal joy in work. It covers all manner of enterprises, for the difference between callings—whether they are of lower or higher worth—is purely conventional. To sweep a room is quite as high a calling in essence as to purchase a million pounds' worth of treasury securities in an office in London. Craftsmanship would point to sweeping the room as the higher calling, that is to say craftsmanship in its narrower sense of being merely physical skill. There is of course a higher sense of craftsmanship. It includes not merely physical skill but the intellectual control of that skill, and the whole mental operation of adapting the physical operations to their true end. Bit by bit, therefore, we come to a new conception of work. It is no mere drudgery. It is no mere penalty for a parental mishap, however august and distant that parent may be. It is no mere sudorific symbol, marking the forehead with tear stains of toil. It is not merely pride in accomplishment, but love of the very details of that accomplishment. Such a love is always self-refining, self-improving, self-developing. In this view work is more than the exterior performance of a task.

"Quite naturally a country which is almost a continent, in writing of the other hemisphere, turns to think of it rather as continent than as a country. So So we read in American journals of saving 'Europe' rather than helping France or England or Italy. In the great division of the Morse alphabet into two aspects there is the same national tendency. The alphabet as we know it, becomes the Continental Morse alphabet; the alphabet as our American brethren know it, is the American Morse alphabet. The differences between the two are known to us all. The Continental alphabet is characterized by its compactness. The American alphabet, to this day, retains its half spaces and its double dashes. The half space adds a curiously minute psychological strain on the telegrapher, and to us who are not accustomed to it this is one of the fundamental difficulties. Now there is no feature of telegraphy more important than the fact that long usage warps the judgment. We are apt, a little too readily, to suppose that the Continental alphabet has triumphed, that the application of printing devices to the Morse alphabet has made the half space impossible. Yet the fact remains that we are partial judges. The born American telegrapher uses his code with amazing skill. When fortified with vibroplex or autodot keys it is astonishing to an Easterner with what speed he can work, and with what pride he can hammer out signals which to us are unmusical and unattractive. A further addition is seen on American news wires in the Phillips' code. When 'President of the United States' becomes 'potus' and the vibroplex key is in use, then we see what a sounder can achieve. It is as much as the typewriter can manage to keep pace with it.

"Making this admission frankly it is open to question if the American alphabet lends itself to craftsmanship as does the Continental. The roundness of the letters—take 'C' and 'P' as examples—seems to have a special beauty. It is true I think that this beauty has been revealed by the sounder. Slip writing is an art which belongs largely to the past but if we had never had the sounder I doubt if we should ever have had the same instinct of craftsmanship in Morse telegraphy. The beautiful sender, as he makes himself known on the sounder, is not the perfect sender as he makes himself known on the slip, though there once was a French telegrapher who put in his will that he should be buried with a specimen of his slip. He was ready, it was said, for all future tests. There is something specially attractive, however, in the comparative looseness of a good 'sounder' sender. The characteristic cable style of sending, with its secure dots and its easily fashioned 'Q' and 'Y' is not exactly Wheatstone when we come to see its symbols on the slip. It is not difficult to explain this. The deeper suggestion of music in rhythmic signaling is very different from the closely symmetrical appearance of sharply fashioned signals on the slip. Moreover there are subtler aspects. Dots and dashes are not uniform in the good 'sounder' sender. Dashes are apt to grow longer in sequence; dots are apt also to become longer, and this is more evident as a Morse sender grows older. But this very characteristic of geometrical imperfection is its very music. It is the difference, again, between the music of an interpreter on the pianoforte and of a pianola. There is human character in the very fashioning of the letters. There is soul in them. And this is true craftsmanship. In the Fleet street of the old days there were senders whom we regarded as downright bad senders whose signals we grew to love. Work would have been dull had it not been for their heavy dots and clipped dashes. We knew and we sorrowed when 'Old Tom' left the wire, if only for supper and for that which supper included in those happy old days. Not that this means that to put character into Morse sending of necessity means malformation. There is all the difference in the world between the adopted formation of the soulful musical sender and the true malformation of the inexpert. The former has system and regularity in its irregularity; it has subtle meanings for the ear in its wonderful modifications of the rigidity of Continental Morse. The

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latter is merely malformation struggling, and often struggling in vain, towards formation. The hearer struggles also. He has no sense of companionship or of mutuality. He looks, and looks in vain, for some continuity or system in the difference. At times, especially in the signaling of figures, he gives it up in despair."

"This is all from the receiver's point of view. The two alphabets have their merits herein. From the sender's point of view it is altogether different. Here, I think, the advantage lies altogether with the Continental system. We owe to Mr. Newlands the first emphasis on digital ease and freedom in signaling. The picture of his hand on the key has spread over three continents. I doubt if even Mr. Newlands would dare to have his hand photographed on a key in the American fashion. Certainly he did a great work for Indian arms and hands in getting rid of the drop key and the resting elbow on the edge of the table. Making every effort to banish prejudice I doubt, too, if the vibroplex key lends itself to craftsmanship as does the Morse key. In fact (though this may be the wont and custom to which Ruskin assigns our sense of beauty) I am inclined myself to think that those beautiful keys of the past, before the development of secondary cells, with their soft touch and their exquisite velvety feeling, lent themselves more than any other to craftsmanship in signaling if they were used with proper freedom and reverence of touch. Certainly there is a mystery surrounding the 'B' key of a quadruplex. It has prejudices in favor of the American alphabet, for it seems to be used in America with a freedom and ease which we cannot rival. All of us know admirable senders who seem unable to do themselves justice on the 'B' side. The hard key of today lends itself to a different mode of craftsmanship. It is more accurate and precise; it is less loveable. It belongs to the day of scientific precision; it has left Victorian poetry long behind it. Ruskin and William Morris might well be the prophets of the dear old soft keys of the past. Munsterberg and Taylor and the prophets of scientific management are more likely to be the heroes of the Morse key of today."

"I believe that the influence of printing telegraphs will not banish Morse but that they will affect Morse craftsmanship is, I think, beyond question. Already I see signs of that influence. It is the difference between a beautiful sentimentalism which just 'grow'd' and a careful, studied, yet equally beautiful scientific study of beauty. The next stage in telegraphy will be a conception of craftsmanship which will still use Mr. Newlands' fundamentals, but will build upon those fundamentals a loftier structure. I should not wonder if that new structure included a change in the figure alphabet. It is the blemish on the Morse alphabet of today, whether American or Continental. This is proved by the fact that none of us use the figure alphabet in the same mental automatic way as we use the letters. We tremble over them; we count the dots; there is nothing, as we may say, natural about our skill. It is a patient skill, laborious and detailed. In respect of letters certain groupings have become part of our mental framework. We think in Morse. A new psychological study might carry research into this aspect very far indeed, with impressive results. I spent my life in Liverpool and often I can hear, in my day dreams, a small boy whistling 'LV.' The old calls arouse deep feelings in us; a long chain of tender association lies behind them. And it is not limited to calls. Our heart beats at the letters 'CQ,' and the beginning of a run of reversals on the sounder brings to us the vision of 'P. A. Gladstone, Verbatim Section T.T., page 46, more to follow.' In finer details we can catch the same glorious thread, the very use of 'Q'—'CQ'—'BQ'—'HQ,' and the long forgotten 'DQ'—are all tributes to the music of 'Q.' I once heard a very interesting discussion as to whether music as we know it, the scale with its two semitones, was part of the original structure of the human mind. But to us telegraphers, born and bred in it, the Morse code is as fundamental as the musical common chord. How it was invented I know not. Some say it was a hurried device to rival the dominance of the Hughes printer in America. But it has conquered the world, including the indomitable minds of the boy scouts. To this mystic realm we come and it adds spirit to our sense of craftsmanship. * * *"

OUR IDEAS.

In America, during the past few years, we have become fairly well acquainted with the Continental Morse alphabet, but telegraphers who for many years have used the American Morse alphabet remain unconvinced as to the claimed superiorities of the Continental alphabet.

As regards the music of the signals, American telegraphers, whose signals are examplars of the art of beautiful sending, can, in American Morse form such words as prince, apportion, cry, cedar, Cape May, raise, rubber, hello, runaway, proper, America, Minneapolis, Boston, and so on, in a manner that to the ears of the connoisseur communicate all that is lovely in rhythm or cadence.

There are American telegraphers who positively dislike the Continental alphabet. At times there has been the suspicion that the Continental alphabet was the first thing the Germans put over on the English, away back at that original "Berlin Convention."

In America we would undoubtedly be the better for a more artistic conception of craftsmanship. We may work up to it.

On our western railroads, where night operators have spare moments and occasionally spare wires, one may hear "The Old Oaken Bucket" rendered in Morse, thus: T-L-N-N. "America the Land of the Free" becomes X-A-R; and every cub operator in the land can play "Pop Goes the Weasel" on the sounder by writing (tenderly) RX RC RY NC. However, to continue Mr. Lee's story:

"The application of typing to telegraphy opens up a vista of craftsmanship which offers immense scope for study. The application of this art to telegraphy calls for highly specialized study. To begin with the application to telegraphy is so aston-

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ishingly varied. The use of the typewriter for receiving by sound is an art of itself. That art, in England, has not been very successful, largely because the speed of the sounder limits the ease of typing. Slow typing is not pleasant work, and there is a further disadvantage. The typing art uses the syllables, often subconsciously, but still actually as syllables. The word 'imagination' to the skilled typist becomes broken into sections which flow easily —'ation,' for example, which is a pretty sequence having a curve shape of its own. But with sounder receiving the writing down of each separate letter is essential, and thus the syllabic aid is absent. In America the use of vibroplex keys and of abbreviation has helped in the development of the typewriter for sounder work, and it is fairly certain that if the typewriter is to be used in this way we shall be compelled to raise the speed of transmission for the mere advantage of greater facility in typing. As regards slip writing we have little reason to be ashamed of our progress."

"Telegraphy is at a disadvantage as a craft. Its product is ephemeral. The cabinet maker may produce a box which will last forever; the dressmaker may produce a dress which will have to outlast the war. But the telegraphers' product may be destroyed at the moment of delivery. With him the process is the craft and not the product. His is the dignity of the effort; the 'virtue consisteth in the struggle.' None the less it is precious craft. Its very aspect of the non-material, non-visible, emphasizes its spiritual value. 'I make things,' said the singer, 'which none can behold; they reverberate in the hearts of men.' We make things which as visible objects are of poor account, flimsy of paper, curt of expression may be short of beautiful in scrip, but it is theirs to reverberate in the hearts of men. To take pride in one's craft is not a new thing. Various industrial and economic developments have shrouded it, they have given us the passion for cheapness, and a wild eagerness for success in commercial competition at any cost in the reduction of the contribution made by craftsmanship. When King Nebuchadnezzar took the people of Judah captive he made use of the princes and the warriors and the craftsmen. The rest of the people he left to do what they would, and he called them comprehensively 'the poor of the land.' That put the craftsman in his proper place. He stood with the prince and the warrior. Some day we shall come back to Nebuchadnezzar's estimate, but the process must begin with ourselves. Neither the world outside us nor the powers above us will regard our craftsmanship with respect until we ourselves regard it with reverence. The beginning is pride of work, the end is the constant development of our craft that pride in it may grow. And that is to say that there is no end. The craftsmanship of telegraphy is a task for us and for the generations of telegraphers to come, and only in so far as we lay the foundation will they be able to build worthily."

## Telegrams That Announced the Termination of Three Wars.

THE CIVIL WAR IN THE UNITED STATES.

"Lee has surrendered" are the words that operator W. E. Kettles received on his telegraph instrument in the war department telegraph office in Washington, April 3, 1865.

We, today, are better able to realize what this famous telegram meant to the people of 1865 than we were prior to our experiences of November 11, 1918. "Lee has surrendered!" That was the message. In a flash it was taken up and passed on by telegraphers, over good wires, bad wires, leaky wires, thin wires, patched wires, and any old wire that would hold current enough to operate a relay. Indeed it is likely that many a relay was coaxed as never before to respond to five mils.

Operator W. E. Kettles, who received the message in the war department office is now and has been for many years a resident of Boston.

SPANISH AMERICAN WAR.

On August 13, 1898 the following telegram was sent:

"To Major-General Brooks:

"By Direction of the President operations against the enemy are suspended. Negotiations are near completion, the protocol having been signed by representatives of the two countries. All commanders will be governed accordingly. By command of Major-General Miles. Acknowledge receipt.

"GILMORE.

"(Signed) M. V. SHERIDAN,
"Chief of Staff."

THE END OF THE GREAT WORLD WAR.

In the recent great world war the message which actually stopped the fighting was written by Marshal Foch, and read:

"To Commanders in Chief:

"Hostilities will cease on the whole front on November 11, at 11 a. m. The allied troops will not, until further orders, pass beyond the line reached at this date and time.

"(Signed) MARSHAL FOCH."

Immediately after this message had been transmitted to the commanders of the forces in the field, it was duplicated in French and English and given to the world over wire lines, submarines cables, telephone lines, and by radio to all parts of the world.

## Telegraph Signals and Vocabularies.

Those who are making a study of telegraph alphabets and cable code vocabularies should possess a copy of the book, "Telegraph Signals and International Code Vocabularies," by James Nicolson. The work contains an analytic study of the various alphabets which have been devised, beginning with Stienheil's, and then taking up Morse's original alphabet, Bain's, Bright's, American Morse and others. The price is $1.00, and copies may be obtained from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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## A Letter From a Wire Chief to a Young Telegrapher Friend.

[EDITOR'S NOTE.—Less than 200 miles from Chicago there is a wire chief in an important office. He has on his staff a large number of assistants. This wire chief has a wide reputation as a successful instructor of telegraph and telephone repeater men and wire chiefs. The letter here reproduced, which was written by him gives a plain reason why he is successful.]

MY DEAR FRED:

I read with pleasure your recent letter and am glad to know that you have been able to become so good an operator in so short a time. I know the zeal of most young telegraphers to become "stars" in their chosen field, and applaud it. That man who is willing to dub along through life a poor, or only a fair workman, lacks something very necessary in the battle of life. So I say to you, my young friend, make of yourself the very best telegrapher you can —a first-class sender both by hand and automatic key and a receiver who has for his motto no such bunk as, "I never break," but, "I break when I must, to turn out good work."

But the young telegrapher should have another ambition. The bank clerk visualizes a future from clerk to assistant cashier, to cashier, vice-president, and finally president of the institution, and some even see themselves at a later date in the cabinet as secretary of the treasury. The cub reporter sees himself a Washington correspondent or a managing editor or a writer like Cobb or Blythe; and so should the young telegraph operator look into the future and set himself a goal toward which to travel.

Never, in the history of the telegraph and telephone has there been such a cry for expert telegraphers who have knowledge of the electrical end of the business; never before could a young man who had spent some of his time in study of Ohm's law, the principles and operation of repeater, duplex and quadruplex sets, and telegraph and telephone power plants, so easily get his chance at a wire chief's position.

For the past two years the men who attend to the employment of wire chiefs and repeater attendants have had to take on green men and teach them from the very start. Why young men don't see the opportunities in this field and prepare for them while telegraphing, is hard to understand.

Recently a chief operator called me and told me that he needed ten men for wire chief and repeater work, and asked me to help him get them. I had to tell him that I was short two myself and had been short for three weeks, and although a number had applied, none of them was equipped with even the fundamentals of the work, and only one or two had even entered high school, and these, after leaving school, had dropped study entirely.

A new era is dawning in the telegraph and telephone business. Heretofore there has existed a reasonable margin of wire facilities, and hence it has not been so necessary to work at full efficiency, but now the outside plants are strained to the limit to handle the load, and the engineering departments of the various companies are developing equipment which will handle a rapidly increasing amount of business with present wire facilities. From these efforts have come the multiplex telegraph apparatus which permits numerous sendings on the same wire, and the multiplex telephone apparatus which multiplies several times the circuits derivable from one pair of wires.

These innovations call for a much higher efficiency on the part of wire chiefs and equipment forces and, together with the telephone repeater, call for wider knowledge on the part of those who handle the inside plants. Increased responsibility should be welcomed as giving an opportunity to display capacity, and those men who look upon these changes as something to evade should get out and make way for men who are willing to exert themselves.

Too frequently the man who asks the chief for a chance on the board or on repeaters has done nothing to prepare himself for an advance in position, but is moved to make his request through a desire to get what appears to him as a "snap" job and an increased salary.

The young telegrapher today who will provide himself with the books of elementary instruction on telegraph and telephone matters and will diligently study them until he can show that he is worth advancing and then, when moved, continue to learn, will have no cause to seek elsewhere for a future both satisfying and remunerative.

My dear Fred, go to your chief operator and tell him (that is, if you intend to continue in the business,) that you want to grow; ask him to tell you what books to get, and then get busy at once.

Get ready, and your chance will come.

Sincerely yours,

UNCLE GEORGE.

February 10, 1919.

## The Western Union Multiplex.

The Western Union multiplex system is completely described in a neat pamphlet published by TELEGRAPH AND TELEPHONE AGE. The description of the system has been revised and brought up to date and the work is fully illustrated with views of the different pieces of apparatus. It was gotten up primarily as an appendix to Jones' Pocket Edition of Diagrams and Complete Information for Telegraph Engineers and Students, but some copies have been bound separately for the use of those who wish to carry it apart from the parent book as a matter of convenience. The booklet is the same size as the Jones' book, and can therefore be easily carried in a coat pocket. It will be found very serviceable to those who are studying the multiplex. The price of the pamphlet is 35 cents per copy. Send orders to TELEGRAPH AND TELEPHONE AGE, J. B. Taltavall, publisher, 253 Broadway, New York.

By the way: Are you working in a functional office?

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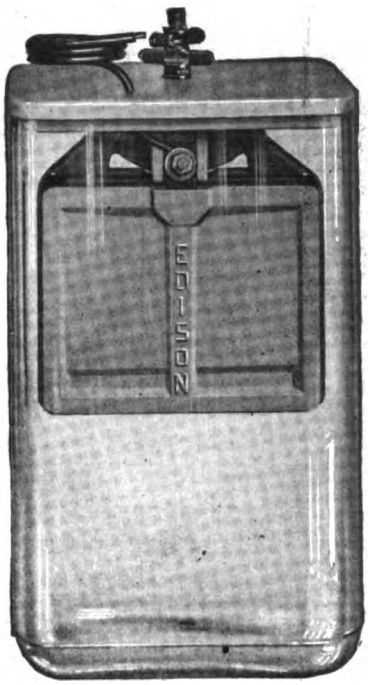
# FOR CLEAR TRANSMISSION

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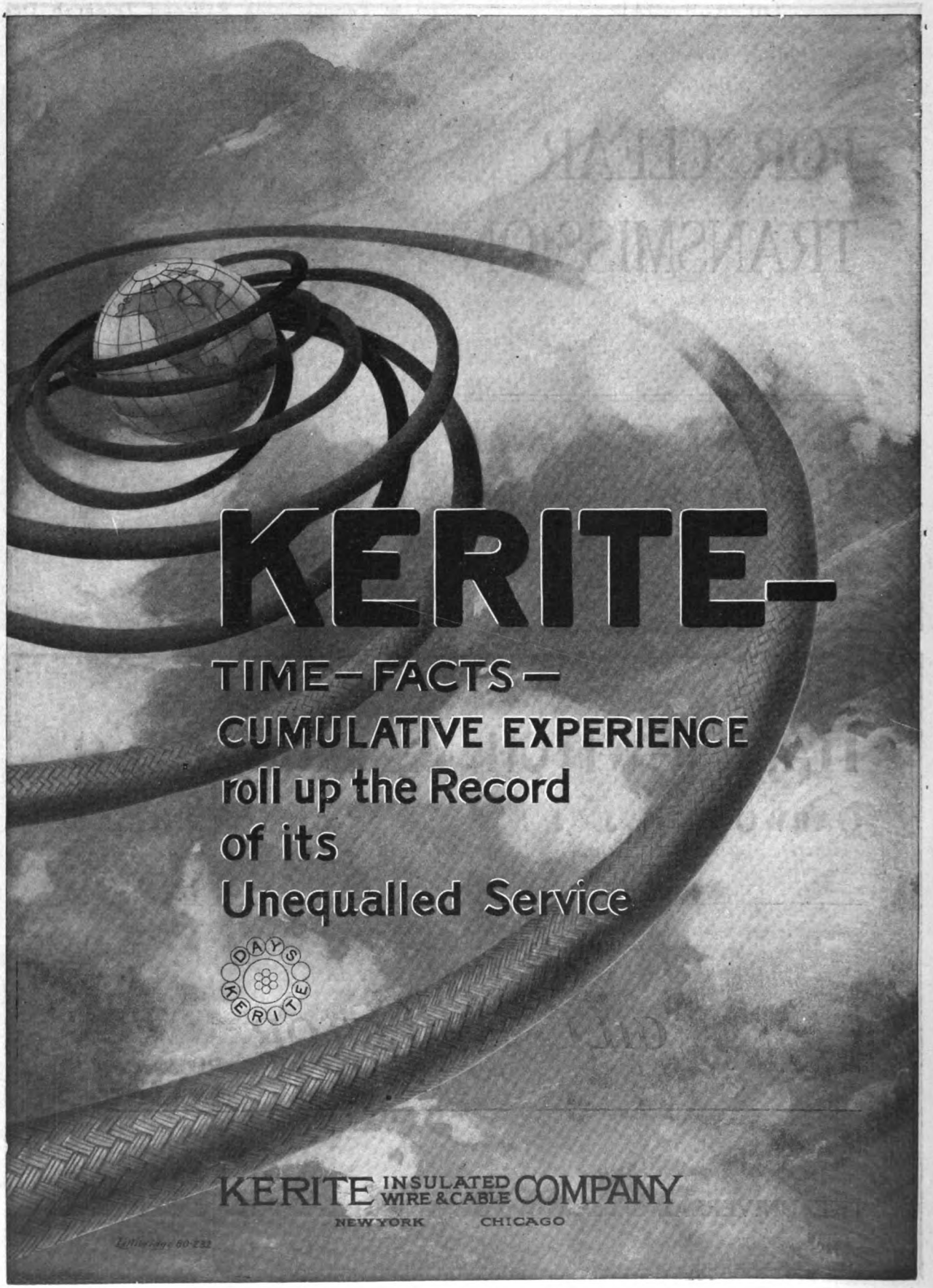


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## THE RAILROAD.

### Charles A. Plumly Appointed Superintendent.

Effective February 1, Charles A. Plumly was appointed superintendent of telegraph of the Baltimore and Ohio Railroad, with headquarters at Baltimore, Md.

Mr. Plumly was born at Big Run, Ohio, October 15, 1876, and has been in the service of the Baltimore and Ohio since he was a boy of eleven years.

In 1887 Mr. Plumly's father was agent and operator at Stewart, Ohio, and it was in that office that C. A. Plumly spent his mornings before school and evenings after school, learning to telegraph. In November, 1887, he was employed as a relief operator at offices between Athens and Parkersburg.

During the thirty-two years Mr. Plumly has served the Baltimore and Ohio Railroad he has progressed through the various grades of operator, agent, train dispatcher, chief dispatcher, division operator, train master, assistant to the general superintendent, inspector of transportation, and now as head of the telegraph department.

### Roscoe Hooper Appointed Superintendent.

Roscoe Hooper, appointed superintendent of telegraph of the Kansas City Southern Railroad, as announced in the February 1 issue of TELEGRAPH AND TELEPHONE AGE, was born in Pittsburg, Tex., March 4, 1882.

Mr. Hooper entered the telegraph service of the Kansas City Southern Railroad at Gilham, Ark., on February 10, 1899, working as operator until 1905, and from that date until 1912 as chief clerk in the telegraph department. From 1912 until his recent advancement to the head of the telegraph department Mr. Hooper was employed as car distributor, dispatcher and chief dispatcher, all in the service of the Kansas City Southern.

R. R. HOBBS, superintendent of telegraph of the Louisville and Nashville Railroad, has been given jurisdiction in the same capacity over the lines of the Nashville, Chattanooga and St. Louis Railroad, with headquarters at Louisville, Ky.

EARL DYER, son of I. T. Dyer, deceased, late superintendent of telegraph of the Salt Lake and Los Angeles Railroad, is in New York on a business trip.

E. L. GOLDEN has been appointed chief train dispatcher of the New York Central and Hudson River Railroad, electric division, with offices in the Grand Central Terminal, New York.

CORPORAL G. A. PELUSE, prior to the war a telegrapher in the service of the Chicago, Burlington and Quincy Railroad, while in France worked in important telegraph relay offices. Corporal Peluse says the American operators using the American Morse alphabet handled the traffic to the satisfaction of all concerned.

### Fire in Pennsylvania Railroad Telegrah Department at Trenton, N. J.

A serious fire occurred in the Trenton depot of the Pennsylvania Railroad Company on January 25, resulting in the destruction of the offices occupied by the telegraph, telephone and train dispatching departments.

Excellent work in restoring communication was accomplished by Division Operator G. W. Shoester, who, when it became apparent that the fire was going to destroy the equipment in service, organized his staff of fifteen electricians, and within a half hour had the work of establishing a new office well under way.

The lines were put out of operation about 9 o'clock, and at 10 o'clock the dispatchers had been installed in the office building at 100 South Clinton Avenue and all of the company telegraph communication and most of the company telephone system placed in operation. The short space of time in which that work was accomplished prevented any difficulty to train service along the New York Division of the railroad.

### Progressive Railroad Linemen.

The telegraph and telephone service maintained by the Delaware, Lackawanna and Western Railroad is recognized as of a very high order. Inquiry develops the fact that the superintendent of telegraph of that road, L. B. Foley, has organized a highly efficient staff of assistants. The wire chiefs at the various terminals are constant students of up-to-date telegraph and telephone literature, and the linemen stationed at test offices are above the average in knowledge of the business. Of the latter Messrs. Herbert C. Axtell and Clemens C. Bean, stationed at Scranton, Pa., in charge of telephone circuit maintenance, are close students of all matters pertaining to circuit operation.

CHARLES SELDEN, general inspector of transportation of the Baltimore and Ohio Railroad, is spending the winter months in California. He is accompanied by his wife and daughter.

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# EDUCATIONAL

## Telegraphy.

### ELECTROMAGNETS.

A term often encountered in text-books is that of remanence. Remanence, reluctance, hysteresis, and residual magnetism are terms that are very closely related, and all of them have as a factor the magnetic susceptibility of the iron used in forming the cores of magnets or pole-pieces of motors and generators.

Even the softest and most finely laminated iron retains some of the magnetism acquired under the influence of the magnetizing current traversing the wire winding. We speak, therefore, of magnetic laziness and magnetic lag (hysteresis), meaning that the magnetization and demagnetization of the cores as circuits are closed and opened do not follow as rapidly as the circuit can be made and broken.

Solid and hard iron cores retain a considerable amount of magnetism after the current in the winding is shut off; in other words, there is a certain amount of remanence. Remanent magnetism is much greater as the iron core is long in proportion to its thickness, because the poles can then exercise magnetizing influence over a shorter distance. Remanence is less if the magnetizing current is suddenly interrupted than if the current is gradually reduced.

### CHARACTERISTICS OF MAGNETIZATION.

When an iron core is for the first time magnetized by means of a wire coil the magnetic strength increases faster while the current strength is low than when the current is nearing its maximum strength; but after the core has been repeatedly magnetized and demagnetized, as in operating a telegraph sounder or relay, this difference in magnetizing rate becomes less.

A completely closed iron circuit such as that of a closed core transformer will show greater remanence than one with an air-gap, such as a telegraph sounder or relay. Consequently, if an electromagnet be permitted to draw its armature into actual contact with its poles, the armature may not fall away when the current in the coil winding is turned off, but will be held fast by the residual magnetism (remanence).

For this reason it is customary in practice to arrange all magnets and armatures so that actual contact between the latter and the magnet poles cannot take place. In telegraph instruments this is arranged by setting armature stop-screws so that the armature will be stopped in its forward movement a short distance away from the pole faces. Sometimes actual contact is avoided by setting a small brass pin in the face of each pole face, allowing the pin to project far enough to prevent the armature from touching the iron cores.

*(To be continued.)*

## Telephony.

### SWITCHBOARD SIGNALS.

Switchboard line-signals consist of 24-volt one-third candle power incandescent lamps mounted in lamp jacks arranged ten to a strip. The insulating material used in the construction of these jacks is of various kinds. One make consists of lava and mica, materials which cannot be destroyed by heating.

Supervisory signals consist of a pair of lamps located in front of each pair of switchboard cords, the lamp jacks being of the individual open construction type. They are mounted on the under side of the key shelf over openings into which the lamps project, and are covered by opalescent lamp caps.

Pilot signals consist of 24-volt, one-third candle power lamps placed in the lower left hand panel of each operator's position, to be used as a calling signal. This lamp is connected so that it will light whenever any line lamp in the position is illuminated, and so that it can be extinguished when the plug is inserted in the jack. A white opalescent cap protects this lamp from injury.

There is also a 24-volt, one-third candle power lamp placed in the lower right hand panel of each operator's position, to be used as a supervisory signal, which is connected so that it will light whenever a supervisory lamp of the answering cord is lighted. A red opalescent lamp is mounted in front of the lamp.

Answering Jacks.—The answering jacks are made in strips of ten, the springs being made of german silver and the insulation of rubber. The strips are provided with removable metal number plates for the line numbers and correspond to the numbers on the multiple jacks.

The multiple jacks are similar in construction to the answering jacks but are mounted twenty to the strip, and are provided with removable number plates. These jacks are arranged and numbered in groups of one hundred, from 0 to 99, from left to right, and from top to bottom, the one hundred numbers being designated by an ivory number plate located on the stile strips at the left of each group of one hundred spring jacks. To aid in the location of any particular jack, each strip has two white spots between the fifth and sixth, tenth and eleventh, and the fifteenth and sixteenth; and the groups of one hundred jacks are separated by narrow strips of white. This scheme divides the multiple into groups of five in each direction.

*(To be continued.)*

## Radio Telegraphy.

Continuing the discussion of the theoretical operation of the audion, begun in the February 1 issue of

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TELEGRAPH AND TELEPHONE AGE, the audion circuit diagram is again presented for the purpose of tracing the action of incoming electromagnetic waves upon the inclosed elements of the bulb.

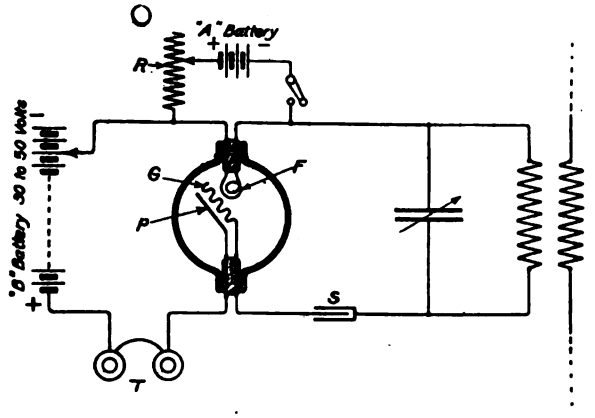


FIGURE 1.

Suppose that an incoming radio signal in the form of an electromagnetic wave impinges upon the aerial wire shown on the right; this, in turn, sets up high frequency oscillations in the wire which is shown connected through the primary of a loose-coupler or air-core transformer. By magnetic induction this current is transferred to the secondary winding of the loose-coupler. There is a flow of high frequency alternating current around the circuit including the secondary winding of the coupler and the adjustable condenser, marked with an arrow. By adjusting the capacity of the condenser, and altering the relative position of the coils of the coupler this

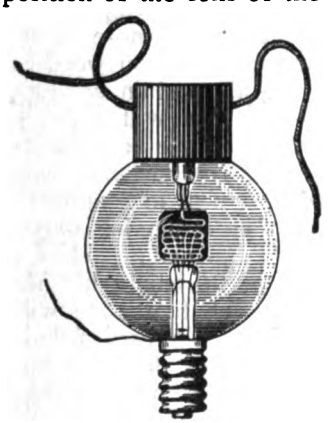

FIGURE 2.

circuit may be tuned to resonance with respect to the incoming wave length. The current here generated having an outlet path via the filament and grid of the vacuum bulb becomes rectified; that is, the negative pulses are permitted to pass from the hot filament to the cold grid. The grid, because of its position in the path of the electron stream, accumulates a considerable negative charge. This charge passes along the wire attached to the condenser *S*. There follows then what might be termed a scattering effect in the electron field between the filament and the wing, with a resulting lowering of conductivity of the evacuated path. The duration of this reduced current flow corresponds to that of the group of sparks, of group frequency of the received signals. As a result of this the telephone receivers *T* are actuated; their diaphragms being partially released, while the incoming wave continues.

Thus it will be evident that by means of a sending telegraph key at the distant transmitting station the transmitting operator's signals cause identical dot and dash variations in the telephone receivers used by the receiving operator.

There are many forms of vacuum bulbs, but the principles of operation of all are practically the same as herein described.

The vacuum bulb illustrated in Fig. 2, contains two thin plates of nickel about one-eighth of an inch from the filament, on either side. Between the filament and the plates are two pieces of nickel wire bent grid shaped as illustrated.

## Shop Talk.

BY THE OBSERVER.

A great trouble with many people taking up the study of telegraph or telephone engineering, after completing their course, is that they find there is much connected with electrical engineering that they do not understand, when read in some particular paper or book. Be not at all discouraged. There is a way out of your dilemma. If the particular article happens to be on alternating currents and is treated by higher mathematics, just remember that this particular subject is treated by some other party with simpler mathematics; that is, you will find a method of handling the alternating current in practice by very simple mathematics. Then again, we find a fellow disconsolate because he does not know it all. Whew! The human body is only one, yet we have dentists for the teeth; eye, ear, and nose specialists; surgeons, and just plain, honest-to-goodness doctors who handle the fevers, agues, etc. Now, if we liken the various doctors and the human body to electrical engineering, we would say an electrical dentist is the fellow that finds shorts, dirt,

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openings, etc., in motors and generators; solders them by patching, etc. The eye, ear, and nose specialist we will liken to the laboratory man who looks, listens and smells various dynamical and chemical tests ere they are promulgated to the commercial world as O. K. The surgeon we will liken to the mechanical engineer who plans the exact cuts, dimensions, etc., for the machinery, whereas our honest-to-goodness doctor we will liken to the handlers of electrical machinery after it is placed in service. I took the case of doctors, as all are familiar with how the ailments of the human body are separated into different divisions for treatment, and that owing to the specific knowledge necessary to properly handle a human body, no one mind can hardly instill sufficient knowledge thereof, and then keep pace with experimental tests, results, etc. You will observe that I brought in a mechanical engineer to look after the design of our machinery. I could hardly do otherwise and be true to the subject. Now, is it not a fact that you do not bring in any outsiders; that you try to encompass the whole thing; sink into the quicksands of top-heaviness and are smothered? Is it any wonder? Decidedly not. While there may be some people well versed theoretically in all branches of physiology, there are none that attempt a general practice covering all. The same pertains to the electrical world. If a person undersands his particular branch of electrical science thoroughly (as near as is practicable), then maintains a reference library for such oddities that may arise, and if he is sufficiently schooled to understand what he reads, then put it into practice, that person is well versed in electrical engineering. Of course, when I say, put it into practice, I do not mean that he must be able to build the machine, because if I insisted that he must be able to build the machine, that would be akin to saying that to be an electrical engineer, one must necessarily be a mechanical genius also. That is not true, any more so than to be a first-class locomotive engineer one must be able to build an engine. This will take me into a boiler yard, and so it goes; showing the utter fallacy of any one worrying because he does not know it all. *(To be continued.)*

## Efficiency Engineering.

*(Continued from page 70, February 1 issue.)*

Are we to have monopoly or competition in the telegraph and telephone services in the future, is a question that seems to worry some of those who are inclined to absorb trouble. If, for instance, the telegraph is to become a monopoly it is argued that it will be no longer necessary to interview the public regarding the utility of the wires as a business promoter and that those in charge of the telegraph will lapse into the same condition of things that prevailed forty years ago when opposition was nil and the managers of the telegraphs cared little or nothing for public opinion.

It is safe to predict that there never will be a time in this country when officials of telegraph and telephone companies can sit in their official chairs, look wise and do little. Supervision and efficiency will in the future be part of every wire organization, whether under government or corporate control. Employees will not be paid for looking wise. They will have to render an honest day's work for an honest day's pay no matter who their employers may be. The laws of equivalents are unchangeable. It may truly be said, however, that the personnel representing the telegraph and telephone industries consists of those who are eager to compete for the best positions in the service. This is as it ought to be. Competition is said to be the life of trade. It is certainly the stimulus that causes man to put forth his best efforts.

Remember, too, that it does little or no good to grumble over the contents of the pay envelope. You say the amount is not large enough to meet expenses. What are you doing to increase it? Are you making your services more valuable, competing with others to fatten the pay envelope or are you bemoaning your hard luck because several of your associates receive larger wages than you do? Perhaps they earn every cent they receive. You may not think so. The employing interest is the better judge. It would be well to remember that those whose pay enevelopes do not contain as much money as yours may perhaps have to go further in feeding more mouths. Rather be sorry for the man who is less fortunate than you are and never begrudge the one higher up who, by personal efforts and burning the midnight oil, has succeeded in ascending the ladder of success one or two rounds higher than you. No one can keep you back if you are determined to forge ahead. Never waste any time in belittling the efforts of others. Life's struggle is difficult enough without your making it more so by kicking and knocking. Better have good words, cheer and encouragement for all, and in so doing you attract others to you and they will brand you as a good fellow, one worthy of the best that there is in life. No one under such circumstances would ever regret your rapid advancement to positions higher up. If your understudy is struggling over some difficult problem and you can make it clear to him do not hesitate a moment to delight his heart by sharing your knowledge with him. He will appreciate it and will sound your praises for years to come. Some day fortune may dawn on him and he may be elevated to a better position than you occupy. Then he will remember you for your goodness and aid in making your elevation to the next higher step in the ladder of life more easy. Always help those who need your encouragement and you can assist them without material inconvenience to yourself. It will prove a good asset to you some day. It has to others and you are not likely to be an exception to the rule. Remember one thing and that is that if you are unwilling to lighten the burdens of your understudy some one else will and when the opportunity occurs as it often does to return the favors you will feel mighty mean in accepting gratuities from the understudy you once refused to aid.

Always remember to do unto others what you would have them do unto you.

*(To be continued.)*

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## The Van Rysselberghe System of Simultaneous Telegraphy and Telephony; the Van Rysselberghe Danish Patents, etc.

BY WILLIAM MAVER, JR.

PART VI.

*(Concluded from page 21, January 1, 1919.)*

It is stated by Mr. T. D. Lockwood in the discussion of Mr. Pickernell's previously mentioned paper that some time after April, 1890 (namely, after it had been my fortune to install the first set of Van Rysselberghe's apparatus on the circuits of the American Telephone and Telegraph Company), he had made the discovery that the Van Rysselberghe United States patents covering his system of simultaneous telegraphy and telephony, had automatically expired by reason of the fact that certain Danish patents covering the same invention had elapsed. This view was based on a United States law which provided that a United States patent granted after the issuance of a patent for the same invention in foreign countries automatically expired with the foreign patents. This law no doubt frequently worked harmfully to worthy inventors, and I believe it has long since been repealed. Mr. Lockwood further states: "So, when I struck this matter of the Danish patent and began to investigate that, I found that 'there was something rotten in the State of Denmark,' as Hamlet would say; and I reported the matter to Mr. Hudson, then president, and gave it as my opinion that we need not dicker with these people that were offering the patents for sale at all, but go ahead and use the invention any time we liked. They asked us two million dollars for it."

Mr. Lockwood attached much importance to the discovery concerning the expiration of the Danish patent, as the following remarks by him in connection with Mr. Pickernell's paper will show: "Mr. Pickernell has written us a very interesting paper on the 'Introduction of the Composite System.' Your chairman (Mr. Lockwood) will undertake to read this, or rather will try to, because there is a gap that the author left in it, that he only knows of. You remember the story of Ethan Allen's clergyman, who continued to return thanks to the Almighty for the great victory at Ticonderoga. The old gentleman didn't say anything when the clergyman had returned thanks to the Almighty for the second, third or fourth time for the victory at Ticonderoga, but by and by the old gentleman pointed his finger at the preacher when he was again in the act of returning thanks for the victory, and said, 'Won't you please mention the fact that Ethan Allen was there?' That's why I am going to read the paper."

With regard to some of the remarks in the foregoing quotations from Mr. Lockwood's discussion, a short digression may be permitted in the interest of strict accuracy, to say that it was not Hamlet, but Marcellus, who said, "Something is rotten in the State of Denmark." Also it may be pointed out that the nocturnal capture of Fort Ticonderoga by Colonel Ethan Allen scarcely comes within the category of "great victories," since the fort was peacefully given up to him upon his rapping at the gate and announcing in rather bombastic fashion his authority for his demands. Again, as Colonel Ethan Allen only lived to the age of fifty-two years, he could hardly have been as venerable as the repeated references to the old gentleman in the story would indicate. But of course story tellers, like poets, are allowed a certain license.

Down to the present day I have no personal knowledge of the accuracy of the statement relating to the expiration of the Van Rysselberghe United States patents in 1890, by reason of the lapse of the Danish patents. But granting its accuracy, the discovery which Mr. Lockwood claims is not unnatural. Indeed, it is possible that if a search of this nature had been within my own province, I, who was not a patent expert, would in all likelihood have discovered the same thing at least four years earlier than 1890. I incline to this view because, in a hastily prepared report to Dr. W. T. Barnard, dated March 14, 1886, I wrote as follows: "* * * To enable me to report as requested on the strength and sufficiency of the combinations or methods claimed by Mr. Van Rysselberghe in his patent, I have utilized my somewhat limited spare time of late * * * and have come to this conclusion, that his patents for the combinations of his various devices * * * are novel and would probably limit their use to the owner of the patents in this country until the patents covering the same combinations should expire in other countries. * * * My views upon this portion of the subject are, of course, only those of a layman, and therefore I should like to know what our patent experts think. * * *" On rereading this report after an interval of many years I find that it contains numerous items of interest on general telegraph and telephone matters which perhaps might be appreciated by present day readers. But as the report contains over four thousand words, I shall only quote briefly from my closing remarks therein: "In conclusion I submit the following reasons why, in my opinion, it may be advisable to take up the Van Rysselberghe option especially if, as I believe, Mr. Lowrey will advise, the option be extended for one year: First. From close personal acquaintance with Prof. Van Rysselberghe I am persuaded he has not given up the attempt to perfect a multiple system, and after a period of relaxation his services looking to that end will be valuable. Second. Pending positive information and opinions *re* the validity or length of life of his patents, and in view of the possible great value of graduators should we combine regular Morse with a tonic system for leasing purposes. Third. Pending results of governmental trial of Bell telephone patent which possibly may break that patent, and which may be decided within period of option, thereby further enhancing the value of graduators. In this latter case also Van Rysselberghe's assistance, experience and advice would, I think, be very useful in providing apparatus not infringing on existing valid patents for telephonic apparatus. The above uncertainties, of course, imply a risk of losing

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the option money, but in view of what we have already gained in the way of knowledge concerning a tonic system, and in view of the possibilities as just enumerated, I think the risk may be warranted. * * *"

It should be pointed out that this report and the reports from other Baltimore and Ohio Telegraph Company officials and attorneys at the same time, did not have in view the purchase of the Van Rysselberghe patents, but were rather a presentation of opinions as to the advisability of renewing the option and paying the option money, to which I have already alluded. If memory serves me rightly all the reports recommended that this be done, and I believe this option money, amounting to $10,000, was paid to Prof. Van Rysselberghe in the nature of an honorarium. This sum probably represents the entire amount received by him in this country for his valuable invention, and it is proper to add that this money was paid to him by a company which was not able to employ the invention.

In the discussion of Mr. Pickernell's paper, as already noted, Mr. T. D. Lockwood stated that he informed Mr. Hudson, then president of his company, that in his opinion they could go ahead and use the invention, meaning the Van Rysselberghe system of simultaneous telegraphy and telephony, "any time we liked." This advice, it will be recalled, was founded on the belief that the United States patents covering the Van Rysselberghe invention had lapsed in this country because the patents covering the same invention had lapsed in Denmark. Mr. Lockwood further states that, not satisfied with his unsupported opinion, Mr. Hudson had to get the opinion of a great number of patent lawyers on the subject. Apparently Mr. Lockwood's views were upheld by the patent lawyers concerned, inasmuch as Mr. Pickernell relates that Mr. Chauncy Smith, general counsel of the American Telephone and Telegraph Company authorized him "to say to Mr. Hall that the system could be used and that they would immediately so advise Mr. J. E. Hudson, president of the American Telephone and Telegraph Company." And from that time on Mr. Pickernell states the Van Rysselberghe invention has been used by his company and has been of very great value.

Notwithstanding the expressed confidence of all concerned at the time (1891) in the legal right to use the Van Rysselberghe system as narrated by Messrs. Lockwood and Pickernell, it is noteworthy that, so far, at least, as I am aware, no public announcement was made until October 27–28, 1916, of the fact that the American Telephone and Telegraph Company was, of right or otherwise, using that system. On the contrary it is probable that any information that use was being made on a large scale of the Van Rysselberghe system in this country apparently was withheld and only reached the outside public by roundabout routes. Especially is this remark true with regard to the technical justification recently presented for the utilization of the Van Rysselberghe invention in 1891; namely, the expiration automatically of the Van Rysselberghe United States patents by reason of the expiration of the Van Rysselberghe Danish patents, which United States patents would ordinarily have expired about 1902.

Until as just intimated the curtain was raised at the Convention of the Telephone Pioneers of America, October 27–28, 1916, by Messrs. Pickernell and Lockwood, information as to the use of the Van Rysselberghe system in this country was, it may be said, a sealed book to the general public. But if an announcement of this use of Van Rysselberghe's invention since 1891 had been written in the sky, there was perhaps no one to question or contest such use. Professor Van Rysselberghe was disheartened by his failure to introduce his system here, and Dr. W. T. Barnard, although as I happen to know, having a suspicion that the Van Rysselberghe system was being employed by the telephone interests in this country, probably could not have obtained prima facie evidence of the fact, even if he had been able physically or financially to undertake the burden of such a contest. That an early public announcement of the use of the Van Rysselberghe system in 1891 and subsequently had not been made, was hardly for lack of opportunities, and for that matter it is probable that occasions could have been found for the purpose, analogously as in the case of other notable advances in the art of telephony.

In support of the supposition that the early use of the Van Rysselberghe invention in the nineties in this country was not withheld from public knowledge altogether by inadvertence, some evidence aliunde may be submitted. Thus in the paper by Mr. T. D. Lockwood, presented to the Association of Railway Telegraph Superintendents at Wilmington, N. C., May, 1899, he states in one place, "Van Rysselberghe, however, went further than this, making a really high class system of composite operation, wherein three messages can simultaneously be sent over two wires. This is described in the United States patent No. 323,239, of July 28, 1885. * * * When care is taken to balance the lines and to properly proportion the condensers and magnetic retardation, or impedance coils, the two classes of transmission can be handled very efficiently and without material interference by this method." It will be observed that occasion is not taken to intimate or imply here (1899) that this statement is based on eight years of practical experience by his company with this system. Nor is there any reference to the condition of things in Denmark as related to this patent, although Mr. Lockwood has stated that he was aware of this condition in 1890. A little further on in the same paper Mr. Lockwood states, "But what I think is a more practical arrangement than any of those so far described is that illustrated in Figure 9 (of his paper)." This refers to a system of simultaneous telegraphy and telephony (a modification of the Jacob system) in which *one* telegraph circuit is obtained from the two wires of the telephone circuit. If this system is or was more practical than the Van Rysselberghe system, which gives two

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telegraph wires from one metallic telephone circuit, it is surprising that it and not the Van Rysselberghe system was so extensively adopted for practical operation. Again, if Mr. Lockwood and his associates in 1891 were satisfied that the United States patents to Van Rysselberghe had irrevocably lapsed, and therefore his system was rightfully open to public use, it is noteworthy that it was not so stated in the paper from which I am quoting. There was no hesitation in so stating in the case of another system, the Jacob, described in the same paper, concerning which Mr. Lockwood writes: "This is a highly practical system, and may often be found useful. Though the Jacob systems were patented, the patent has expired and any one may, if they please, employ the combinations described therein." Here was an excellent opportunity to make a similar statement concerning the Van Rysselberghe patents. Rather it is perhaps implied that the Van Rysselberghe United States patents still controlled his invention. There may have been a reason for reticence on this point. As already noted, in the discussion of Mr. Pickernell's paper Mr. Lockwood refers to the United States patent law which "provided that if any patent was taken out in the United States which had previously been patented in any foreign country, the United States patent was limited to expire with the earliest expiring foreign patent." The advantage taken of this law in the Van Rysselberghe case is clearly indicated by Mr. Lockwood. There was, however, another United States law in existence at that time, and it may still exist, which provides that, if through no fault of an inventor a United States patent should expire before the inventor had reaped a remuneration somewhat commensurate with the value of the invention, the inventor may appeal to Congress for an extension of his patent, and Congress may, if there is proper warranty therefor, extend the life of such a patent. No doubt patent attorneys in general at that time were aware of the existence of this other law, and it may be that a consideration of the possibilities along this line could account in some measure for the unheralded use of the Van Rysselberghe system to which reference has been made. Be that as it may, it is admitted that advantage was taken of the expiration of certain United States patents, due to a technicality, to employ as stated the exceedingly valuable Van Rysselberghe system of telegraphy and telephony, for the period from 1891 to 1900–1903, during which time the said patents would normally have been in force, and thereafter. While this use of the said invention under the conditions mentioned was entirely legal and had numerous precedents, it is highly probable that all concerned now wish that fortune had been more propitious to the inventor in this case.

Before closing this article, and in view of the facts presented herein, especially in view of his great contribution to the art of simultaneous telegraphy and telephony, hitherto unrequited, I feel constrained to venture a hope that steps may yet be taken, perhaps by his own people, at least to put, in some enduring form, a tribute worthily commemorative of the genius and merits of Francois Van Rysselberghe, the Belgian.

## The Buzzer as a Telegraph Receiving Instrument.

The paper with the above title which appeared in our January 16 issue, written by H. A. Emmons, has attracted wide interest. Some of our readers think that neither the buzzer system nor the Continental code will make any inroads in this country if the object of their use is to compete in traffic handling with the sounder and the American Morse alphabet. Other correspondents take the view that buzzer operation opens up avenues of communication which will have far reaching benefits both for the business of telegraphy and for telegraphers.

F. A. Stumm, the well known old-time telegrapher, and who is a close student of telegraph development, says:

"Professor Morse's conception was essentially a buzzer record. I doubt whether he had in view soundless or recordless space as designating dots and dashes. If the stylus had not paper ribbon to plough up and the revolving cylinder had been finely corrugated lengthwise, the buzzer effect would have been present. In the early apparatus the paper ribbon did sometimes give out, or break, and the receiving operator was not always on hand when this happened. This condition quite naturally prodded the early telegraphers to abandon the tape and to substitute sound reading. There is no denying the fact that the register and the eye were never so trustworthy a combination as the sounder and the ear."

Edward Blakeney, of New York, contributes the following as his views on the subject of buzzer operation and in general of the use of the Morse system for handling telegraph traffic:

"I was greatly interested in Mr. Emmons' paper published in TELEGRAPH AND TELEPHONE AGE of January 16, for I have long recognized the fact that the sounder method of reading telegraphic signals is both primitive and absurd.

"Undoubtedly this method arose, as Mr. Emmons suggests, out of the fact that after listening for a long time to the clicking sounds emitted by the register, the early telegraphers finally acquired the ability to read them. Thus, out of the merest chance and without any design whatever, a method arose which was destined to play a highly important part in the telegraphic practice of the future. There is no record, so far as I know, that any voice was ever raised in protest against this method. But if such a voice was raised it must have been quickly and effectively silenced, for it produced no effect. The method was adopted and, in spite of its manifest crudity and its other deficiencies, it is still a part of approved telegraphic practice.

"The function of the register is to make certain long and short marks on paper, and this the instrument is entirely capable of doing.

"The function of the sounder is to give audible

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expression to these same long and short marks, and this the sounder is incapable of doing. Instead, the sounder emits a click which we are asked to accept as representing the beginning of a mark; and then another click which we are asked to consider as representing the end of the mark. Between these two clicks there is an interval of silence, and it is up to the reader to evaluate this interval and thus determine whether it is a dot or a dash. Now, these two clicks are very much alike in tonal value, hence considerable difficulty is experienced in distinguishing the one from the other. This is shown in the fact that even experienced operators sometimes mistake the one for the other and thereby get what we call the "back stroke." Thus the sounder does not give us true long and short sounds, but only an adumbration of them, and the necessity of dividing the attention between two actions, when it ought to be concentrated upon one, results in a loss of efficiency which is clearly shown in the fact that twice as many hours of practice are required to attain a given proficiency in reading from the sounder than are needed to attain the same proficiency in reading from an instrument which, like the buzzer, emits true long and short sounds.

"Mr. Emmons says the difference between the two methods is vital to the learner. It is; and it is vital to everybody else who is interested in having good work done by simple and correct methods instead of bad work by complex and defective methods."

## The Passing of "Dolan's."

Within the past month there has disappeared from the ken of man, Pat Dolan's restaurant on Nassau Street, New York. From the early sixties of the past century until a month ago, at Pat Dolan's place supplied a fashion in pastry and a quality of beef which seemed to appeal particularly to the needs of telegraph and newspaper men.

In the early seventies, while Mr. Edison was experimenting with the quadruplex, he could be found in the Western Union operating room or at Pat Dolan's. Many influential New York newspaper men have, from their cub reporter days, frequently dined on Dolan's celebrated "beef-and."

J. Frank Howell, the well known ex-telegrapher, now president of the Consolidated Stock Exchange, New York, in a recent letter to TELEGRAPH AND TELEPHONE AGE, takes occasion to refer in a reminiscent way to the passing of Dolan's. Mr. Howell says:

"Our last meeting was in the sun parlor of Andy Horn's museum, near Brooklyn bridge. On that occasion, as you may remember, Old Man Kav was planning a consolidation of the establishments of Pat Dolan, Sandy Spencer, Pat Flynn and Apple Mary. The deal fell through and the old man never recovered. And now requiem has been heard over the last of these haunts—Pat Dolan's falling into the hand of the real estate manipulator, as did the others. What commodity can be dispensed there in the future that will in excellence compare with Dolan's 'sinkers-and'?"

## Experimental Wireless Stations.

EXPERIMENTAL WIRELESS STATIONS. By Philip E. Edelman, 272 pages; 98 illustrations.

This book is intended particularly for experimenters in wireless telegraphy as a guide to a rational study of the art. One of the main objects of the book is to provide a standard design for so-called amateur stations, to take the place of the many varieties of hit and miss apparatus constructed and purchased by experimenters.

The matter has been written with particular regard to clearness, simplicity and direct usefulness, and among the subjects covered are: Nature and theory of wireless transmission; aerials; grounds and lightning protection; general features of transmitters; resonance; calculation of wave length, capacity and circuit; transformers; spark coils; transmitting condensers; design and construction of spark gaps; detectors; solid rectifiers; tuning; interference prevention; right of the experimenter, etc. A supplement contains much matter of value, which brings the book up to date and explains the audion, time signals, balancing aerials, vacuum valves, amplifiers, etc.

Copies of this book may be purchased for $1.50 each from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

## Willis Jones Makes a Discovery.

Willis H. Jones, the author of "Jones' Book of Diagrams," failed to receive three consecutive issues of TELEGRAPH AND TELEPHONE AGE. Upon being assured that we had regularly mailed the journal to his address, Mr. Jones organized an investigation. He now writes us that his investigation is complete and the mystery solved.

In recounting the various steps taken by him and commenting thereon, Willis says that a woman's brain——a woman's brain—— Let us see what he did say? It will not stand repeating. At any rate, what he discovered was that the three lost copies of the AGE had been deposited in the wastepaper reservoir used for accumulating fire kindling literature, and one of the women members of his household explained to him that she had considered the magazine worthless, as it did not contain any shirtwaist advertisements or reports of euchre parties.

W. F. MUTH, a former well known Philadelphia operator, now in the brokerage business, Newark, N. J., in remitting to cover his subscription for another twelve months, writes:—"You may rest assured that having been a subscriber since 1883, I have no idea of breaking the habit of renewing each year."

W. H. STANSELL, manager, Postal Telegraph-Cable Company, Richmond, Va., in renewing his subscription for another year writes:—"Never stop the paper coming to me. It improves with age. If I ever fail to pay you sue me for the money."

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## INDUSTRIAL.

### International Western Electric Company, Inc.

C. E. Pingree has been appointed vice-president and general manager of the International Western Electric Company, Inc., and vice-president and managing director of the Western Electric Company, Ltd., Canada, succeeding Gerard Swope, who resigned to become president of the International General Electric Corporation. Mr. Pingree joined the Western Electric Company in 1903, after graduation from Dartmouth College, and his early work was in the clerical and financial department of the Clinton street office in Chicago, then the executive headquarters of the company. He occupied successively positions in the Cincinnati and Chicago offices, and was assisant treasurer at New York and at one time general telegraph sales manager, with headquarters at New York. In 1908 Mr. Pingree went to China as the company's special representative in the Far East, and upon his return was appointed to the position of managing director of the company's London house. This position Mr. Pingree has since occupied, in charge of the company's extensive engineering, manufacturing and sales activities at that point. During the past six months he has been in New York, which will be his headquarters after May 1.

### International General Electric Company.

This is a new corporation organized for the purpose of handling the export business of the General Electric Company.

Articles of incorporation were filed with the Secretary of State of New York, at Albany, on January 17. The capital stock is $20,000,000, of which one-half is 7 per cent cumulative preferred stock and one-half common stock. The directors of the company are Gordon Abbott, A. W. Burchard, C. A. Coffin, George P. Gardner, J. R. Lovejoy, S. Z. Mitchell, G. F. Morrison, Charles Neave, E. W. Rice, Jr., Gerard Swope and O. D. Young. Charles Neave, of Fish, Richardson and Neave, attorneys, New York City, is chairman of the board of directors. Gerard Swope, formerly vice-president of Western Electric Company, Inc., has been elected president of the new corporation, and M. A. Oudin has been chosen vice-president.

### Electrical Inspectors Meet.

The Western Association of Electrical Inspectors held its fourteenth annual convention at the Hotel Sherman, Chicago, January 28 and 29.

The election of officers resulted in the following being selected for the ensuing year: President, C. K. Cregier, Chicago; first vice-president, K. W. Adkins, Kansas City, Mo.; second vice-president, O. M. Frykman, Minneapolis; William S. Boyd, of Chicago, was re-elected secretary and treasurer. The executive committee was appointed as follows: K. W. Adkins, C. K. Cregier, O. M. Frykman, J. W. Strub, F. G. Waldenfels, W. B. Doss, Chas. Stewart, and R. H. Robinson.

### Cedarmen Hold Annual Meeting.

The twenty-third annual convention of the Northern White Cedar Association was held at the Hotel Radisson, Minneapolis, Minn., on January 21 and 22. Representatives of twenty-four member companies were present. L. L. Hill, of Minneapolis, was elected president; L. A. Furlong, Minneapolis, vice-president; W. B. Thomas, Manistique, Mich., and N. E. Boucher, Minneapolis, were re-elected treasurer and secretary, respectively.

### Kellogg Switchboard and Supply Company.

The annual report of the Kellogg Switchboard and Supply Company of Chicago, shows that the net billings for the year 1918 amounted to $5,900,000, as compared to $5,200,000 in the previous year.

Seymour Guthrie, secretary of the company, in a preliminary report, said that the telephone business showed contraction and would remain in uncertainty until government policy is fixed, but he expressed assurance that large business must be expected from the companies eventually.

### Roscoe Johnson Returns From France.

Captain Roscoe H. Johnson, of the 311th Field Signal Battalion, returned from France with his battalion on the battleship Nebraska, on January 27. The battalion has gone to Camp Grant, Ill, for demobilization.

When war was declared Johnson was chief operator of the United Press at Chicago, having the entire central division of that organization in charge. He previously had served with the New York and Colorado National Guard organizations, and a few days after the declaration of war received a lieutenant's commission in the signal corps.

He was sent to Fort Leavenworth, Kan., for intensive training. Later he was transferred to Camp Grant, Ill., and commissioned captain, in which capacity he went to France in 1918, in command of the 311th Battalion. He saw active service in the front line trenches until the signing of the armistice.

The only trouble Captain Johnson had was with German gas, which laid him up for a time, after which he rejoined his command.

During the past fifteen years Roscoe Johnson has been recognized in telegraph circles as one of the fastest sending operators in the business. He comes from a family of telegraphers. His father, Fred R. Johnson, is now, and has been for years, in charge of various telegraphic wires for the *Evening Sun*. Captain Johnson has a wife and son now in Chicago. His second son died while the captain was overseas, without having seen his father.

### Working the Wireless to Wire the Workless.

The wife of Corporal Koskiusko telephoned the Marconi office asking if she could send a free wire by wireless to her husband in France to come home and take the place of foreman in her laundry.

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## OBITUARY.

E. F. WELSH, for several years retired from the telegraph service, died in St. Peter's general hospital, New Brunswick, N. J., on January 30, and was buried in that city on February 1. Mr. Welsh first entered the service of the Western Union Company in the year 1872, and with the exception of five years spent in the west—1883-1888—he was in the service continuously until his retirement a few years ago. Since 1890 Mr. Welsh has been employed in the New York office as assistant wire chief, traffic chief, and as member of the plant department staff in New York.

GEORGE E. CROMWELL, aged eighty years, a veteran telegrapher and a member of the United States Military Telegraph Corps during the Civil War, died at Bradford, Pa., recently. Mr. Cromwell was a member of the main office force from the close of the Civil War until his retirement about twenty years ago. Since that time he had lived at Damascus, Pa., although he occasionally visited his New York friends.

ANDREW M. NICHOLS, aged seventy-six, an old time telegrapher and a member of the United States Military Telegraph Corps during the Civil War, recently died at Grand Rapids, Mich.

J. C. LINDSAY, formerly an employee of the Chicago office of the Western Union Telegraph Company, died at New Orleans January 18.

AXEL PETERSON, formerly connected with the Chicago office of the Western Union Telegraph Company, died overseas sometime in January.

ERNEST W. EMERY, JR., son of the late E. W. Emery, long a prominent Associated Press telegrapher, died recently of pneumonia at the naval station, Norfolk, Va. Mr. Emery was twenty-two years of age, and prior to entering the naval service was employed in the Washington bureau of the New York *Sun*.

JOHN L. CAULFIELD, sergeant in the 112th Signal Battalion, on duty in France, formerly telegraph operator in Steubenville, Ohio, died in France, October 12, his death being due to pneumonia.

### Future Issues of "Telegraph and Telephone Age."

In our March 1 issue we will have a big story about what American Morse operators who went to France with the A. E. F. accomplished. The story is being written by officers of the signal corps who gathered the information first hand at the fighting front.

Also we have in preparation an account of radio development which will contain much important and interesting information.

Other up to date, live stories are coming along. Tell your non-subscriber telegraph friends to send for a sample copy of the March 1 issue of TELEGRAPH AND TELEPHONE AGE.

### Give Us a Boost.

Our subscribers are in a position to aid us in making TELEGRAPH AND TELEPHONE AGE a bigger and better magazine. Subscribers who aid us a little enable us to do big things for them.

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We now have ready for delivery bound volumes of TELEGRAPH AND TELEPHONE AGE for the year 1918. These volumes are bound in serviceable cloth covers with the magazine title and year on the back.

The twenty-four issues of TELEGRAPH AND TELEPHONE AGE for the year 1918 contain a large amount of technical matter relating to telegraphy, telephony, radio telegraphy and submarine cables, as well as a complete chronological report of the progress of government control of telegraphs and telephones. No technical library is complete without a copy of this book. The price for the complete year is $4.00, carrying charges 50 cents extra.

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# Telegraph and Telephone Age

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BACK NUMBERS of this journal three or more months old will be charged for at the rate of 25 cents per copy.

NEW YORK, MARCH 1, 1919.

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### Sport.

There is an old Danish proverb which tells us that "Earnestness and sport go well together."

It is perhaps only in the large centers that organized sports can be carried on by telegraph employees; that is, with telegraph unit identification, but the nature of the telegraph business is such that there are many telegraph offices with staffs large enough to maintain athletic organizations.

Men engaged at indoor, physically inactive work should spend a portion of their time off duty in some form of healthy exercise. Exercise intelligently taken, and with sport as the first object, results in the building up of a healthy body. A healthy body makes possible a healthy mind. A healthy mind means sanity, mental and physical grace, and happiness. Baseball, our national game, has many devotees in the telegraph and telephone services—only a small proportion of them organized into clubs. However, the writer has before him about twenty-five group photographs showing uniformed baseball clubs made up of telegraph employees.

TELEGRAPH AND TELEPHONE AGE will be glad to supply space in its columns for reports of games and for the reproduction of photographs of uniformed teams.

A peculiar situation, and one often commented upon is that very few land line telegraphers enter the submarine cable service. An explanation sometimes offered is that the pay is not as high as on land lines. Again, one will hear that the cable stations are at lonely spots and that the conditions are unattractive. Indeed, there are land line operators who wonder where in the world the submarine cable companies get their operators. There are land line telegraphers who have been in the business twenty years and have never met a cable telegrapher. To them, perhaps, the cable man is somewhat of a myth.

The fact of the matter is there are thousands of cable operators, and they form a very exclusive and select breed of gentlemen. They enter the service young and remain in it for life. Inquiry develops the information that submarine cable telegraphers have two hobbies: their daily stint at the key, and their daily stint with the tennis racket or golf sticks.

A classy periodical, *The Zodiac,* published in London, and circulated among cable men the world over, in the November, 1918, issue contains an article entitled "The Return of Sport" in which appears the following passage:

"The atmosphere of war changes at once the whole atmosphere of sport. We are not capable, as the Germans were, of using games as a national physical preparation for war. We play our games as we have built our Empire, primarily for fun, not for what we get out of them. Sport with us is a natural expression of good health and good comradeship. It is fundamentally a spontaneous thing. And when with the coming of war we found it to be a splendid physical training we were like children who have been disillusioned about fairies. Some of the zest had gone out of games—and of life."

However, "in the life of the cable service there are few things more important than sport," and now that "the Captains and the Kings depart" the cable man shall undoubtedly become himself again.

It is not difficult to understand why the cable companies rarely find it necessary to advertise for help:

"Oh! there is sweetness in the mountain air,
And life, that bloated ease may never hope to share."

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# CURRENT EVENTS

## Executive Office Announcements, Personal Mention, Appointments

### PERSONAL.

THOMAS A. EDISON on February 12 started for Florida where he will remain about two months on his plantation at Fort Myers. Mr. Edison now is seventy-two years of age.

MAJOR W. E. HARKNESS, of the Ordnance division, War Department, Washington, was a New York visitor on February 18. Major Harkness for many years was a member of the engineering staff of the Western Electric Company, and of the Hall Switch and Signal Company.

J. W. DAVIS, chief dispatcher of the pipe line department, Standard Oil Company of Louisiana, has been in the service of that company since December 15, 1910.

RALPH W. POPE, honorary secretary of the American Institute of Electrical Engineers, and who resides at Elizabeth, N. J., was a New York visitor February 19.

FRANK A. STUMM, an old time telegrapher and a member of the United States Military Telegraph Corps, during the Civil War now living in retirement at Arcola, N. J. was a recent New York City visitor. He was accompanied by his wife.

### POSTAL TELEGRAPH-CABLE COMPANY.

EXECUTIVE OFFICES.

HENRY W. HETZEL, traveling auditor, has returned from an extensive trip to offices in the western and southern parts of the country.

HAROLD CASSERLY has been acting as chief clerk in the office of the vice-president and general manager since M. A. McConnell entered the military service.

MANAGERS APPOINTED: Clara J. Horstman, New Brighton, Pa.; E. C. Hartley, Ellinwood, Kan.; R. D. Lucky, Decatur, Ala.; S. D. Dennehy, Tiffin, Ohio; H. N. Budmen, Camden, N. J.; H. E. Rumbarger, East Pittsburg, Pa.; M. Hayes, St. Joseph, Mo. (Grain Exchange office); W. H. Easterlin, Tuskogee, Ala.; R. Disheroon, Hot Springs, Ark.; J. L. Richardson, Orangeburg, S. C.

B. ARRON, for several years chief operator at Worcester, Mass., has been appointed manager at Manchester, N. H.

A. W. RINEHART, who during the past seventeen years has been manager of the Pittsburg, Pa., office, has resigned and is succeeded by W. H. Bassett, manager of the Erie, Pa., office. Mr. Rinehart, prior to his appointment as manager, had served as chief operator of the Pitttsburg office during a period of eleven years. Upon his leaving the service the employees of the main and branch offices in Pittsburg presented Mr. Rinehart with a valuable gold watch as a token of their high esteem.

### WESTERN UNION TELEGRAPH CO.

EXECUTIVE OFFICES.

NEWCOMB CARLTON, president of the company, who has been in Europe for some weeks past, sailed from England for New York on February 26.

W. D. CHILDS, for many years representative of the Western Union Telegraph Company in Russia, is reported to have died of starvation in Petrograd.

OFFICIALS who attended the transfer of the main office in Pittsburg on February 1, were: J. J. Welch, traffic engineer; S. R. Crowder, office layout engineer; S. B. Haig, division traffic superintendent; M. C. Allen, division plant superintendent; W. J. Dodge, district traffic superintendent. Elsewhere in this issue of TELEGRAPH AND TELEPHONE AGE there is an account of the equipment installed in the new Pittsburg office.

D. H. CAMERON, assistant superintendent of the cable station at North Sydney, N. S., is in New York on business.

CAPTAIN BELVIDERE BROOKS, Company C, 308th Infantry, 77th Division, was killed in action on the Vesle river, August 21, 1918. Officers returned from France report that Captain Brooks was reconnoitering the position into which he was to lead his company the following night, near Ville Savoye, west of Fismes, when struck by fragments from an exploded enemy shell of the type called a whizzbang.

W. R. WILLIAMS is acting as manager of the Washington, D. C., office, vice T. M. Haston, advanced to the position of division traffic supervisor at New York. Mr. Haston is taking a short vacation in the west before assuming his new duties.

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## New York Western Union.

HARRY WOODHOUSE, in charge of the ticker service at Boston, spent several days recently in this office looking into the methods of handling this branch of the commercial news department service.

DANIEL SULLIVAN, statistical clerk of the general operating department, died February 17.

THE WIRE CLUB, of which G. C. Gute is president, and H. M. Heffner, in charge of the Commercial News Department, is vice-president, on February 15 inspected the new Pennsylvania Hotel, and were much impressed with the magnitude of this up to date hostelry.

S. E. MEYERS of the Navy, and H. H. Butterman of the Army, have been released by the government and have been added to the force in the Commercial News Department.

ABOUT ONE THOUSAND EMPLOYEES of the Western Union attended an entertainment and dance Friday evening, February 7, at 24 Walker Street, under the auspices of the Western Union Educational Society. Several musical selections, vocal and instrumental, were rendered by home talent. F. A. Hoag, president of the society, presided and made a few remarks on the purpose of the society, what had been done, what was being accomplished and what was in contemplation. The dance was one of a series that will be given during the remainder of the winter. The room was handsomely decorated and excellent music was furnished for dancing, and all who attended expressed themselves as being highly pleased. The officers of the society are: F. A. Hoag, president; Miss L. M. Park, vice-president *pro tem.;* S. C. Crumpton, secretary-treasurer.

MISS EMMA RUSSELL HAMMELL, daughter of G. W. Hammell, chief operator, Western Union Telegraph Company, Augusta, Ga., on Saturday evening, February 14, gave a recital at the Edison Studios on Fifth Avenue, New York. Miss Hammell has for some time been taking a finishing course in singing and her great success is a credit to her parents as well as to herself.

## Managers' Meeting at Manchester, N. H.

On February 12 a meeting was held at Manchester of managers of the eighth commercial district, eastern division, attended by thirty-five managers.

The purpose of the gathering was to stimulate the telegraph business and to discuss suggestions having in view possible betterments in the service.

Vice-President J. C. Willever and General Manager T. W. Carroll, New York, were represented at the meeting respectively by A. C. Kaufman and John Simmonds. J. W. Reed, superintendent of the eighth district, also was present.

During the week meetings of the same nature were held at Portland and Bangor, Me., and at Burlington, Vt.

## Employees of the Fourth District Metropolitan Division Hold Annual Banquet.

The fifth annual dinner and reception of the employees of the fourth district, metropolitan division, Western Union Telegraph Company was held at the Hotel Bossert, Brooklyn, on the evening of February 26.

The addresses delivered all breathed a spirit of confidence in the future of the telegraph business, the officials and managers present expressing themselves as being convinced that the company is well prepared to take efficient care of its share of the increased business that will develop as reconstruction progresses.

## New Office at Pittsburg.

Shortly before midnight of February 1, the general operating department of the Western Union Telegraph Company at Pittsburg, Pa., was moved from its old location on Fifth Avenue, to the new Chamber of Commerce building, situated at the corner of Seventh Avenue and Smithfield Street. The new quarters occupy the entire sixteenth and part of the fifteenth floor, a total floor space of approximately 26,000 square feet, in this up to date, fireproof structure.

The operating room has a northern and western exposure with windows well above the height of surrounding buildings, insuring good light and ventilation. A well arranged semi indirect lighting system, rivalling daylight conditions, provides for illumination of the office at night.

The Pittsburg main office bears the distinction of being the largest repeater station in the country, being equipped with forty-one of the new universal duplex repeaters. Other interesting figures are as follows:

Morse positions, 150.
Multiplex equipment, 4-Quads, 3-Triples, 6-Doubles.
Switchboard sections 9.
Repeater tables 12.
Wires: main line 240, loops 115, time service 22.
Message through distributing center per 24 hours 8440 approximately.

A complete belt conveyor system is provided for the carrying of messages to and from the distributing center. Pneumatic tubes connect with five of the nearby branch offices; house tubes are also used for handling business to and from the commercial office on the ground floor and the district offices on the seventh floor.

## Chicago Western Union.

J. P. EDWARDS, division traffic superintendent, was in New York a few days recently.

H. F. DODGE, formerly of San Francisco and Los Angeles, but during the past two years division traffic supervisor at Chicago, has resigned from the service and will engage in business in San Francisco.

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Before leaving for the Pacific Coast Mr. Dodge was given a farewell banquet by his Chicago associates.

GEORGE E. PALMER, until recently chief operator of the main operating room, New York, has been appointed division traffic supervisor, succeeding H. F. Dodge.

A. B. COWAN, general manager of the Central Division, at Omaha, was a recent Chicago visitor and called upon his many friends here.

GEORGE W. KINDER, division traffic supervisor at Omaha, formerly of the Chicago dispatchers' force, was in Chicago recently on a business trip.

BEN H. ANDERSON, testboard attendant on the west board, has been transferred to the main office at Omaha.

MRS. LONG, wife of A. Long, division traffic superintendent at Omaha, is in Chicago visiting friends and relatives.

CAPTAIN FRED PEPPERDINE, formerly of the plant department, Chicago, who has been in the United States Signal Corps service overseas, has arrived home on sick leave. Captain Pepperdine wears two wound stripes, having been gassed and received gunshot wounds in action on the fighting front.

ON THE FIRST NEW YORK multiplex circuit, working at forty cycles, the Chicago women operators, during a recent ten day period, averaged fifty messages, not equated, per hour.

FIVE OF OUR BEST "mux" girls, were recently sent to Jacksonville, Fla., to help out during the rush incident to the fruit season. The operators selected for the trip to the sunny south were: Winnie Conahan, Anna Sullivan, Isabella Potenz, Mamie Grossman and Mabel Kellogg.

THE *Telegraph World,* official organ of the Association of Western Union employees, made its initial appearance, February 5, and is a credit to its sponsors. Office engineer E. F. Wach is editor. The *World* is to be used as a medium for the interchange of thought between association members, having in view technical and educational improvement. The first issue contains a complete list of the district organizations and their officers.

ROY DOBBINS, formerly assistant chief operator at Dallas, Tex., has been transferred to Oklahoma City, where, on January 20 he assumed the duties of chief operator, succeeding C. M. Thompson, transferred to the testing and regulating department Dallas, Tex.

## Ask Us for What You Want.

Recently one of the circuit dispatchers in the Chicago office received a service message from a wire chief in the Washington, D. C., office, reading: "Can you give me Honolulu direct for 2,000 words, quick?"

## New Orleans Western Union.

J. W. MCMAHON, of the main office, New Orleans, has been appointed dispatcher in charge of circuit and wire assignments, and of the movement of traffic.

## Charles H. H. Cottrell.

"Now a member of the Old Guard of the telegraph, but still in possession of the spirit of goodfellowship that makes steadfast friends of all new acquaintances." This is the tribute paid Mr. Cottrell by a prominent telegraph official in the south.

Charles Cottrell was born in Cleveland, Ohio, in 1848. After leaving school he studied telegraphy in the shop's office of the Cleveland and Pittsburg Railway. At fourteen years of age he was given his first position as operator, at Bayard, Ohio, remaining in railroad telegraph service three years. He soon became a first class telegrapher and in 1865 came to New York and took a position with the American Telegraph Company. During the following six years Mr. Cottrell worked in telegraph offices in Philadelphia, Washington, Atlanta, Boston, Worcester, Louisville, Buffalo, Chicago, Omaha and Ogden.

In the year 1871 he accepted a position as operator in the New Orleans office of the Western Union Telegraph Company, and there made such substantial progress that in 1875 he was appointed chief operator. In 1875 he entered the service of the Associated Press and was sent to the London, England, office. Shortly after returning to the United States Mr. Cottrell again located in New Orleans and was there through the yellow fever epidemic of 1878. In 1879 he reentered the service of the Associated Press and was sent to the Washington office. In 1886 he came to New York and joined the forces of the United Press, remaining in that service eleven years, working as operator and later as cashier.

Mr. Cottrell was for several years secretary and treasurer of the New York Red Cross hospital, and a short time before the breaking out of the Spanish American war, he was sent to Cuba as treasurer of the American Red Cross Society, remaining there until the close of the war. He then returned to the United States and for a year was engaged as assistant to President Clara Barton of the Red Cross, closing up the financial affairs incident to the society's activities in the war.

Mr. Cottrell was then fifty years of age, and looking around for a place to "settle down" he selected his beloved New Orleans, to which city he returned in the year 1900 and has remained there until the present time in the service of the Western Union Company, where he is exercising that "goodfellowship which makes steadfast friends of all new acquaintances."

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## Radio Telegraphy.

MARCONI NOTES.

E. J. NALLY, vice-president and general manager, sailed from Plymouth, England, for New York, February 26, on the steamer New Amsterdam.

THE NAVY DEPARTMENT has released the high power stations of the Marconi Company at Belmar, N. J., and Chatham, Mass.

HENNING WILLMER, radio operator on the Swedish-American steamship Stockholm, was found dead in his room on the ship on the morning of February 16, while the vessel was at her dock in the Hudson River, New York. The cause of operator Willmer's death is said to have been due to a stock of disinfectant supplies which were temporarily stored in his cabin.

## The Lafayette Radio Station.

It is reported from France that rapid communication with America was of supreme importance to General Pershing while the war was at its height, and that it was at his urgent representation that the Lafayette radio station at Bordeaux was erected by the United States navy department. This station is described as the largest and most powerful radio plant in the world. The power of the station is said to be 1,200 kilowatts, and it provides for reliable communication at all seasons of the year.

## Radio Telegraph Suit.

The Court of Errors, the court of last resort in the State of New Jersey, on January 7, affirmed Vice-Chancellor Lane's judgment against the Marconi Wireless Telegraph Company, awarding royalties of $300,000 to the International Radio Telegraph Company of New York.

## Uruguayan Radio Stations and the War.

According to a report from Montevideo the use of the port of Montevideo for provisioning, repairing and coaling British cruisers during the war was of great value to the allies. It is stated that no other country permitted the use of its wireless stations for cipher messages. The station at Cerrito was the sole medium of radio communication between the British admiralty, the naval base at the Falklands, and the South Atlantic fleet. Benevolent neutrality on the part of the Uruguayan authorities played an important part in the battle of the Falklands.

## Annual Meeting of the Mackay Company.

At the annual meeting of the Mackay Company held in Boston, February 15, the following trustees were re-elected for the ensuing year: Clarence H. Mackay, William W. Cook, George G. Ward, Edward C. Platt, George Clapperton, Milton V. Blackmar, the Right Hon. Lord Shaughnessy, K. C. V. O., of Montreal; Sir Vincent Meredith, President of the Bank of Montreal; Sir Edmund B. Osler of Toronto, and Sir Thomas Skinner of London.

The statement of the situation of the company, as prepared by Barrow, Wade, Guthrie & Co., accountants, and announced at the end of the meeting, follows:

PROFITS AND LOSS ACCOUNT.
Feb. 1, 1918, to Feb. 1, 1919.

| | | |
|---|---|---|
| Receipts— | | |
| Income from investments in other companies | | $4,695,496.62 |
| Disbursements— | | |
| Dividends paid on The Mackay Companies shares, | $4,388,667.00 | |
| Federal Income Tax, Transfer Agents, Registrars, Auditors, and Trustees' Compensation, office rent, salaries, stationery, engraving of certificates, &c. | 301,120.86 | |
| Balance carried forward | 5,698.76 | |
| | | $4,695,496.62 |

BALANCE SHEET.

ASSETS.

| | |
|---|---|
| Investments | $93,277,977.33 |
| Cash | 26,574.03 |
| | $93,304,551.36 |

LIABILITIES.

| | |
|---|---|
| Preferred shares issued | $50,000,000.00 |
| Common shares issued | 41,380,400.00 |
| Surplus | 1,924,151.36 |
| | $93,304,551.36 |

Before the submission of the annual report, which set forth the company's determination to continue to resist Government ownership in the interest of the better service obtainable through competition between private firms, Mr. Mackay voiced his belief that Postmaster General Burleson would fail in his ambition to control all communication facilities of the American people.

"We look for an early return of our lines," he said, "for under the Act of Congress they are to be returned to us on or before the proclamation by the President of the ratification of peace, and we do not think that is very far off. Furthermore, in view of the recent increase in telephone rates by the Postmaster General with promises of further increases to come, and the threat to increase telegraph rates, there is a very strong demand coming from all over the country that the lines be returned immediately to the owners.

"The Postmaster General has the power to return all or any part of the lines to the companies at any time.

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# WITH THE MORSE OPERATORS IN FRANCE

## United States Signal Corps Officers and American Telegraphers Establish Enviable Record for Service in War Area. 102 Telegraph Offices Established.

"American telegraph operators certainly ticked their way to glory during the big months in France which led to the final overthrow of the Huns," said a returning officer recently. And his words merely echo the opinion of all men who were in a position to observe the workings of the great machine known as the A. E. F.

It is safe to say that many telegraph operators went to France with a feeling of regret that they were not a part of some other branch of the Signal Corps where more action in the open was to be expected. But notwithstanding the brilliant exploits of other Signal Corps men who time after time accomplished the seemingly impossible under devastating fire, there are none who contributed greater service or earned honors for bravery, coolness and devotion to duty, than did the telegraph operators.

When the operators come home many of them will come honorably decorated. Theirs was a service, it is true, which was not by nature conspicuous, but it is a matter of war record that the telegraph operators who left their desks in the United States to serve with the forces in France distinguished themselves on innumerable occasions and in innumerable ways.

Many of them who believed that they were going to be deprived of the excitement of facing fire, sat fearlessly at their keys and sounders while shell fire shook the shelters in which they worked, caved in a roof here, covered them with debris there, destroyed instruments and sent the operators themselves to the hospitals for treatment. But the operators sat tight until compelled to take cover, resuming their interrupted work the moment repairs had been made and contact reestablished.

Compared with the vast forces which made up the fighting armies of the A. E. F. and the vitally important Service of Supply (S. O. S.) the telegraph operators numbered a mere handful. And yet they accomplished miracles.

Starting when the great service of supply was launched to take care of the fighting armies that followed, the Signal Corps took over the responsibility of establishing communication between all American Units. At first French lines were used, but in September of 1917, when the United States began its epochal work in building new harbors and wharves and warehouses and supply depots and motor roads—to say nothing of a complete long distance and local telephone and telegraph system extending from tide water to the front line trenches—the Signal Corps took up its all important work of linking the whole vast network.

All the material had to be brought from America, everything but the poles, and to the everlasting credit of the Signal Corps it may be said that the service of communication in every way kept pace with the growing demands of the army. The telegraph lines made it possible for the service of supply to feed and clothe and equip our ever increasing forces; made it possible also for the motor transport to work systematically; made it possible for the directing heads to manipulate the French and American railway lines, and to report each night on the arrival and departure of every ship together with its contents. In other words, the telegraph lines made possible the effective use of the great supply and transportation systems which other branches built up in record-breaking time.

To illustrate in a word the volume of business which the American telegraphers in France handled each day it is interesting to compare September, 1917, with a daily average of a few hundred telegrams to the daily average of over 32,000 telegrams, each averaging fifty-seven words in September of 1918. If the significance of this total is more clearly understood when reduced to commercial terms, the telegrams sent and received over American lines in France by American operators in September, 1918, would amount at current French rates to an annual business of $9,000,000. Almost 2,000,000 words per day was the achievement of operators who a year previous were working in commercial offices in the United States, when the lines in France as yet existed only on paper and in requisition orders.

What this meant in terms of "sweat and blood" none but the personnel will ever know, for the number of operators was never adequate to the amount of business on hand. Lines and stations increased by leaps and bounds, but notwithstanding constant acquisitions to the personnel, the force simply could not keep pace in growth with the demands for service. Therefore the operators on hand set their jaws and worked all the harder.

With true American spirit the operators whipped their job—they never let the job get the better of themselves. Hours on duty meant nothing; indeed hours off duty were forgotten for days at a time. Days were divided into "on duty" and time off to snatch a little sleep and a bite to eat. And when sleep and meals cut deeply into the precious hours operators disobeyed orders by working longer than they should have, relying upon their nerve to pull them through.

And what places they had to work in! Any

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shelter sufficed—a dug-out, a stable, the ruins of a church or a residence, a pup tent, a sheet-iron lean-to—anything that would keep out a fair percentage of wind and rain and shrapnel would do until better quarters could be provided.

Many an operator who, back in the States, was very particular about the facilities of his operating table, was grateful for a stout box upon which to mount his key. Lacking a stout box a couple of boards would do. There was no standing on form, but there was on the other hand the fullest exercise of true Yankee ingenuity.

Great as was the need for telegraph operators in furnishing the spark of communication which made the American supply and fighting organizations effective, the skilled telegraph operators constantly volunteered for dangerous service with buzzer phones, radio sets, and ground telegraphy in the assault zones. Those lucky enough to be assigned to these tasks proved beyond a doubt that there was no finer morale in France than that of the men who sat at the telegraph keys hour upon hour, regardless of weather or weariness, or worse.

Signal Corps experts, confronted with the necessity of maintaining communication between American units reaching from the coast of France to the battle front, and from the channel to the Swiss border, developed instruments and methods which will improve telegraph and telephone service the world over when the secrets of war are applied to peace-time commercial lines. Wonderful progress was made in the utilization of the same lines for simultaneous sending of telephone and telegraph messages. Yet, marvelous as have been the inventions, scientists themselves give fullest praise to the spirit in which the operators attacked their mountains of work.

To illustrate the physical proportions of the telegraph and telephone systems built and operated by Americans in France, it is now known that the Signal Corps erected before the armistice 1,750 miles of poles, supporting 4,175 miles of wire. On existing French lines the Americans strung 2,000 miles of American wire and in addition, 3,000 miles of French wire were leased and used. Exchange lines were built to the extent of 12,750 miles. To operate these lines 102 telegraph offices, 244 telephone offices and 7,995 telephone stations were established. All this was done in one year of bitter war and against terrific odds—truly a splendid monument to the men of the Signal Corps and to the determination of America.

The clean-cut single-pole cross-arm telegraph lines of the Americans gave a new and distinctive note of hope and confidence to the French landscapes just as did the straight and freshly shaven men in khaki to the towns and streets of France. The French main line system use two poles side by side, some wires being strung on cross bars between the poles and others on single insulators fastened directly to the pole. Times without number, Yankee troops on the march cheered and felt cheered at "meeting up with" telegraph lines of single poles and shining copper wire "like the lines back home."

Just as this vast labor in construction was accomplished by Signal Corps battalions fresh from America, from materials brought from America—with the single exception of some poles—and under standard practice followed in the United States, so too the operators who maintained communication between all the vast fighting and service forces of the American Expeditionary Forces, gave service the quality of which has never been surpassed in the security of the commercial world, and which other armies frankly envied.

Signal Corps linemen followed wherever troops went, laying wire, stringing wire, placing wireless stations. And Signal Corps operators went on, and on, and on, wherever the troops went, maintaining contact between the posts of command and gas filled trenches, or isolated shell holes, over fields swept by barrages and areas raked by machine gun fire.

Heroic traditions will go down through the ages from deeds which Signal Corps men performed as "all in the day's work." For the privilege of keeping the controlling mind in touch with the charging lines—for the honor of lying in No man's Land or within the enemy lines and by radio or buzzer phone directing the fire of American artillery—for the glory of going over the top ahead of the zero hour and establishing a point of communication ready to flash the news of progress toward objectives when the shock troops came up—to make this contribution to victory many operators paid with their lives.

The operators included former Western Union and Postal Telegraph men, railroad operators from all parts of the country, Associated Press and United Press and other news agency and newspaper operators, as well as newly graduated students of the dot and dash. But previous affiliations made no difference in the loyalty or course of the key men.

**Bound Volumes of "Telegraph and Telephone Age" for 1918 Now Ready.**

We now have ready for delivery bound volumes of TELEGRAPH AND TELEPHONE AGE for the year 1918. These volumes are bound in serviceable cloth covers with the magazine title and year on the back.

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Address orders to TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

**Only One Dot Left Out.**

"When rats are lowered ship ten cases to Hong Kong."

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# THE AUDION AMPLIFIER

## Its Development By Lee de Forest.

### Illustrations of new types of this wonderful device.

For more than twenty years telephone engineers had sought in vain a repeater or amplifying relay, which should be at once extremely sensitive, free from delicate and frequent adjustments, and yet which would amplify every modulation or variation of the human voice, without distortion. Without such a relay the telephone, at that time, was limited to a few hundred miles.

This problem of the telephone relay had baffled all the numberless inventors and engineers in the telephone industry. It was the *ignis fatuus,* the illusive will 'o the wisp, which looked so simple, yet which eluded their most praiseworthy efforts.

So keen did the search become, so hopeless seemed the realization, that an eastern telephone company in the late nineties offered one million dollars for a successful telephone relay. That prize was never claimed, nor awarded.

Almost without exception these telephone engineers and inventors attacked the problem from the same angle. They saw one method which afforded a solution. That was: to associate in some manner the elements of the well-known telephone receiver with the well-known telephone transmitter, or carbon miscrophone. The method was a mechanical one, and always, in the last analysis, failed.

If sufficiently sensitive, its elements required constant adjustment by experts. Temperature changes upset the delicate balance of its parts if amplifying sufficiently. Moreover, it "packed" or "fried," was horribly "microphonic." Unless in perfect adjustment voice distortion was a frequent fault. As a matter of course it failed to perform the inconceivably difficult and delicate task asked of it—where current changes representing a millionth part of a watt of electrical energy were required to push and heave pieces of iron and lumps of carbon!

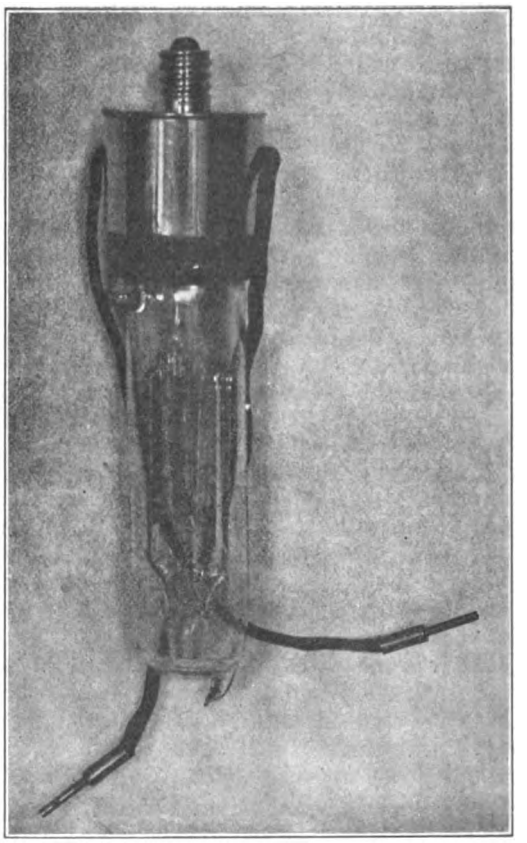
Yet the telephone engineers persisted; numberless patents were issued, and untold thousands of dollars were spent on the problem. And meanwhile, through all those years, the long distance telephone halted; stopped effectively by that trifling little barrier—the repeater relay.

Professor Pupin, of Columbia University, had discovered and patented the inductance coils which alone made it possible to speak intelligibly on overhead lines one thousand miles, or over cables twenty miles in length. He sold his patents to the Bell Telephone Company eighteen years ago, but the transcontinental telephone still remained a commercial impossibility. Theoretically it was possible to build a line with very large copper conductors and plentifully spaced with Pupin coils, to enable us by using large electrical currents in the transmitter, to telephone across the continent. But commercially the staggering cost of such a line put this method absolutely out of consideration—it was impossible. So the telephone world waited hopefully for that yet unfound: the relay which could alone enable one to send, clear and audible, the infinitely delicate variations of the voice across North America.

And that amplifier was at last discovered—not by telephone engineers, whose minds had for years spun in the old rut of receiver-microphone "siamesed" together.

We must thank the "Wireless" for this revolution in ideas telephonic, which at last and alone enables you today to talk from San Francisco to New York.

Way back in 1902, Dr. Lee deForest, beginning his pioneer experiments with wireless detectors, discovered that a heated gas was "sensitive" to the weak "wireless" waves, and could constitute a new detective for use in radio telegraphy.



DE FOREST AUDION WITH OXIDE TYPE OF FILAMENT. THIS IS ONE OF THE LATEST FORMS OF THIS WONDERFUL INSTRUMENT.

In 1903-04 he made on this principle a genuinely practical detector, possessing a sensitiveness far in excess of that of any hitherto known wireless receiver. Indefatigable in his efforts to further im-

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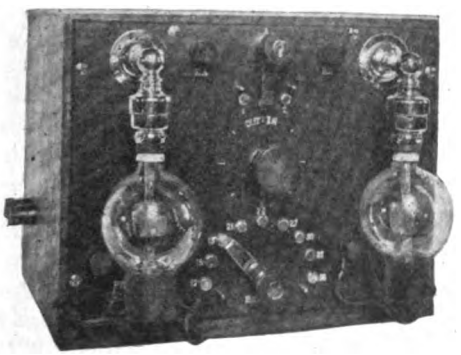
prove and apply his "audion," this little incandescent lamp (which made *audible* the action of the *"ions,"* or subatoms of the heated gas around the filament), Dr. deForest discovered that these "ions" responded to telephonic currents, as well as to those of the far higher frequencies used in wireless.

He found that when this strange device, so utterly new to the telephone field, was properly connected in the line between a transmitter and a receiver, the audion actually amplified the voice currents, giving a reproduction of perfect fidelity without a trace of lag or distortion, yet with an increase in volume, or intensity.

He patented the audion amplifier in 1907, but it was not until 1912 that he had brought it to such a state of perfection that he felt justified in bringing it to the attention of the engineering staff of the American Telephone and Telegraph Company.

One year later that company purchased an exclusive license under all the deForest audion patents for wire telephone purposes. It was not long thereafter that unofficial announcements were made that in 1915 the long-dreamed-of transcontinental line was to become a reality.



THIS ILLUSTRATION IS OF A TYPE P. N. AUDION RECEIVER. THE BULBS ARE MOUNTED ON EITHER SIDE OF THE CABINET.

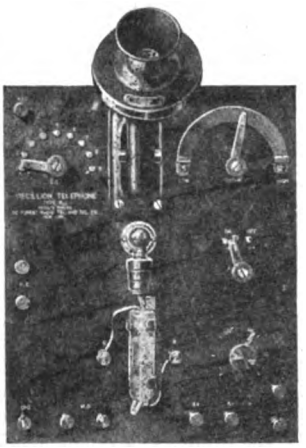
True, from small beginnings the transcontinental line has been evolved. All honor to the hundreds of engineers and inventors whose cumulative work has made this possible. But it is not true to say that, "In all the 3,400 miles of line, there is no one spot where a man may point his finger and say, 'Here is the secret of the transcontinental line; here is what makes it possible to telephone from New York to San Francisco.'"

One element after another came—first the Bell receiver; then the Berliner microphone; then adequate line construction, and Pupin coils to prevent voice distortion, but the one last missing link—the genuine *sine qua non* is the audion amplifier of deForest. His little lamp links the Eastern with the Central, the Central with the Mountain, and that with the Pacific Coast lines.

What then is the nature of this wonderful device which today rings New York and San Francisco into the same telephone booth?

The audion amplifier consists of a small incandescent lamp bulb exhausted of air, containing in addition to the usual filament, two thin plates of nickel about one-eighth of an inch from the filament, on either side. Between the filament and plates are two pieces of nickel wire bent grid-shaped. That is all. Can you imagine anything more simple—more utterly unlikely to operate as a repeater of telephone currents?

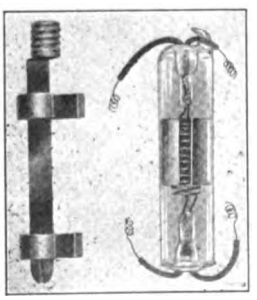
The incoming current, to be repeated and amplified, is conducted to the "grid" wire. The outgoing line is connected, one terminal to the plates, the other to the filament. In this circuit is found a



RADIO TELEGRAPH AND TELEPHONE TRANSMITTER, SMALL SIZE.

battery. A separate battery lights the filament to incandescence. The heated gas becomes then a conductor of the local current from the battery, which can pass from the cold plates to the hot filament.

In other words, negatively charged "carriers," "ions," or "thermions," as they may be termed, speed in invisible streams, of almost infinite tenuity, from filament to plates, passing in their migration through



DE FOREST AUDION, TYPE T.

the spaces between the wires of the "grids." Now the slightest electrical potential, or charge of electricity, impressed upon these grids from the incoming telephonic currents deflect or retard some of these tiny carriers of negative electricity. This effect is always proportional to the cause, so that the current changes produced in the outgoing, or "plate" circuit, are exactly similar to those current

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changes, or electrical charges, upon the "grid" wires which produced them. But the changes in current thus produced are many times in volume or intensity the changes in current which caused them. In other words a unit electrical charge delivered upon the "grid" produces a deflection, or stoppage, of six to ten unit electrical charges passing from the filament to the plates. Hence we have the strange amplifying properties of the audion.

The one most essential and completely novel element in the whole strange device is the "grid" member, interposed across the path of the traveling "ions" (wanderers, as their Greek name implies).

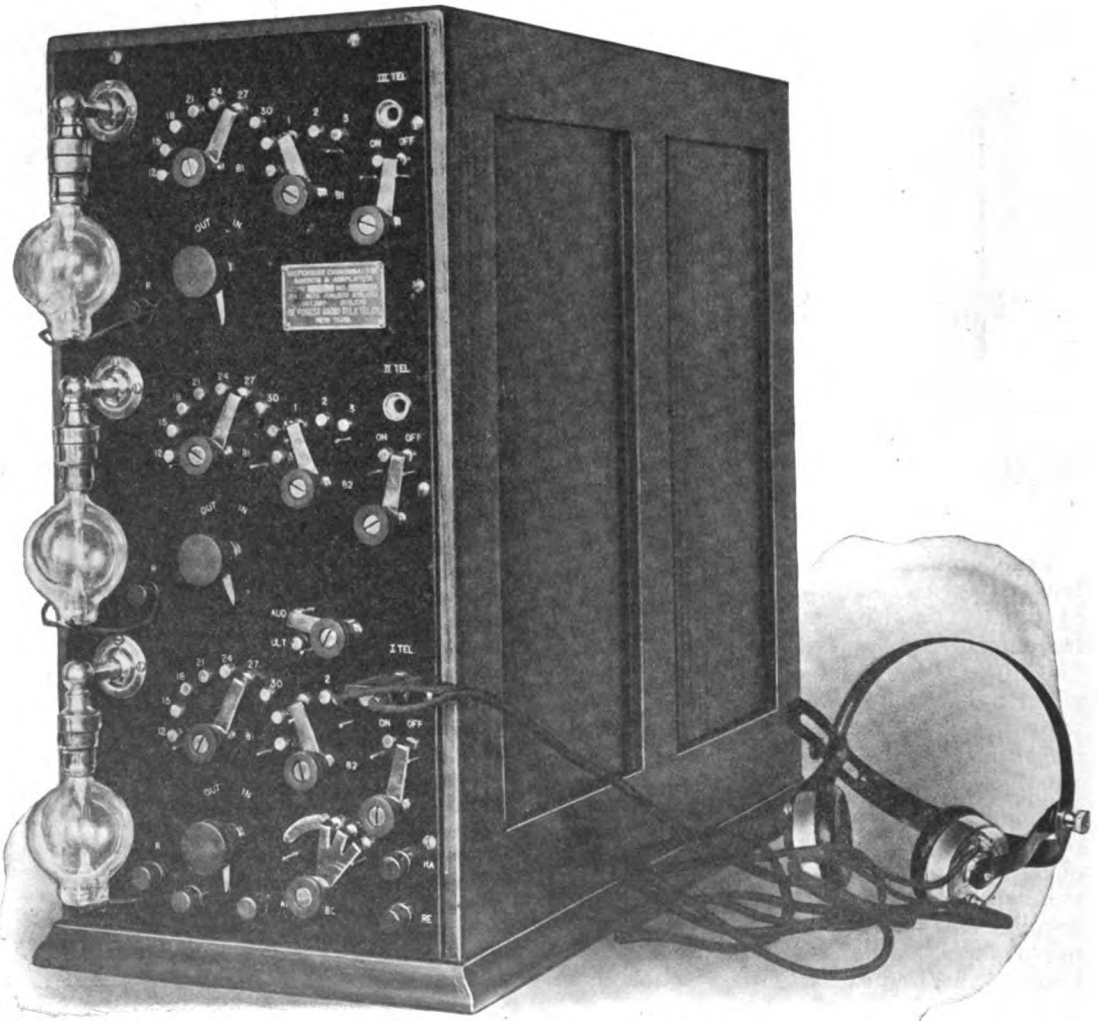
Dr. deForest chose to deal with "ions," gas atoms or subatoms—matter in its most tenuous form—what Prof. Crookes well styled the "fourth state of matter."

Try to imagine one of these ionic carriers of the voice currents or electric charges, and contrast it with a carbon granule of a microphone transmitter of the early "telephone relays." Compare a soap bubble with a load of coal, and you will have some relative idea of the difference between the delicacy and elegance of the audion and that of the old microphone relay.

The deForest audion is today receiving wireless messages in New York, and at the great naval station at Arlington, Va., from San Francisco; Nauen, Germany; Paris, France; and from the radio stations in the Pacific Ocean.

Transoceanic telephony by submarine cable, with numerous Pupin coils and the audion amplifier, is theoretically possible—commercially an utter impossibility. The cost of such a cable would be prohibitive.

But transoceanic wireless telephony is today almost within our reach. The deForest audion and amplifier, extending as they have the range of wireless, making loud those signals which are otherwise inaudible, alone makes this far-reaching revolution in our future means of communication possible.



COMBINATION AUDION, ULTRAUDION AND TWO-STEP AMPLIFIER.

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## Address Delivered by Mr. George Clapperton Before the Japan Society at New York, February 1, 1919.

The idea of electric communication between the Pacific Coast of America and the Pacific Coast of Asia is nearly as old as the telegraph itself. The telegraph was extended across this continent to the Pacific Coast in 1861. Immediately there was a look forward to an overland line of telegraph by way of Behring Strait and Siberia to Europe. The Atlantic cable had not yet been laid. The venture of 1858 in the Atlantic had ended in disaster, and there were grave doubts whether an Atlantic cable ever would be laid. Meanwhile Europe was making great progress in the building of telegraph lines. Russia proposed to extend her telegraph system across Siberia to the Pacific Ocean. To meet this Russian extension America surveyed a route through Alaska to the Behring Sea. It was declared practicable and construction was commenced in 1865. Eight hundred and fifty miles of telegraph line was built north of the United States Canadian boundary when the news came that the Atlantic cable of 1866 had been laid, the lost cable of 1865 recovered, and Europe and America were connected by two cables.

There was no basis for revenue in 16,000 miles of land line by way of Alaska as against the Atlantic cables, and so the Alaska-Siberia project of a line from America to Europe by way of Asia was abandoned. But the Russia-Siberia line was there from Europe nearly to the coast of the Pacific, and there was a natural desire to utilize it, so it was deflected from its original purpose, extended to China, and by cable to Japan. Japan was thus brought into electric communication with Europe and with America by way of Europe.

From time to time interest revived in the plan to lay a cable from America to Asia by way of the Aleutian Islands adjacent to Alaska. The favorable features of this route were brought out by its advocates. The unfavorable ones were and still are considered by those who lay and operate cables to derive a return on the capital invested, and they say that the ocean bed is unsuitable; the tides in the neighborhood of the islands are rapid and uncertain, the course of the cable would be parallel to the Japanese Current, a dangerous stream, the islands are volcanic, and the whole region is fog bound for months in the year. At other times the winds are described by one historian navigator as of greater force than any in his experience. Shocks of earthquake and volcanic phenomena, disastrous to cable workings, are of frequent occurrence. Altogether, it is a place where cables ought not to be. The plans contemplate a junction with the Japanese land lines at a northern point, presumably to avoid the Japanese Current curving around the coast of Japan. But although Japan is a land of many beauties, it has some discomforts, among them typhoons and floods very trying to land lines, and, in fact, Japan's land lines are frequently interrupted. Cable communications to be reliable must be brought to a center of commerce, important in itself, and from which the more reliable lines of telegraph radiate. For instance, although the cables from Europe to America had increased to the number of nine, there never was reliable cable communication between Europe and New York City until the Commercial Cable Company, abandoning the tradition that cables must be landed at barren spots in order to avoid shipping and ship's anchors, boldly brought its 1884 cable into the lower bay of New York harbor and underground to the corner of Wall and Broad Streets. That was the inspiration of the general manager of the Commercial Cable Company, now a member of this society, Mr. George Gray Ward. New York City has always had reliable cable communication since then. No less than fourteen cables now come up from the sea into the lower bay, and are operated in the vicinity of Wall and Broad Streets.

So with a northern cable across the Pacific to Japan, to be reliable and useful, it should run into Tokio or Yokohama; but to run into Tokio or Yokohama it must be laid in or across the Current or Black Stream, and the Black Stream is a stream to be avoided. Hence the Aleutian Islands project, if ever attempted, is doomed to fail.

All Pacific cable projects came to nought until 1898. Important events occurred in 1898. The Hawaiian Islands were annexed by the United States. There was war with Spain. In 1899 the Philippines and Marianne Islands were annexed. With these insular possessions the question of a Pacific cable came to a head. President McKinley sent a message to Congress urging action, and stating as a condition that communication should be established in such a way that the cable landings be wholly on territory of the United States. The only way to meet that condition was to lay a cable from California westward to the Philippine Islands, taking in the Hawaiian Islands and Guam on the way. On account of the distance an island intermediate between the Hawaiian Islands and Guam had to be selected. Midway was chosen. It was a sand bank, a mile and three-quarters long by three-quarters of a mile wide; area, two and five-eighths square miles; highest elevation, forty-three feet; but it is well protected by circular coral reefs about eighteen miles in circumference. The Commercial Pacific Cable Company undertook this formidable task and completed it in 1903. It laid a cable of 2,276 miles from San Francisco to Honolulu; of 1,332 miles from Honolulu to Midway; of 2,607 miles from Midway to Guam; of 899 miles from Guam to Bonin, to connect with Japan's cable to Tokio; of 1,632 miles from Guam to Manila, and of 1,264 miles from Manila to Shanghai, making in all a system of 10,010 nautical miles.

Rates were cut all around. Reductions varied from 24 to 60 per cent.

The rate from San Francisco to Manila was reduced from $2.47 per word to $1.00 per word; to Japan from $1.88 per word to $1.21 per word.

Beyond Guam there is a network of cables connecting and interconnecting all the countries of the Orient. In normal times the only probability of interrupted communication by the Commercial Pacific

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cable is in the sections east of Guam. Of these the San Francisco-Honolulu cable, laid in 1902, has never been disturbed. Its operation has been continuous except for a few days at the time of the great fire. The Honolulu-Midway section, laid in 1903, has never been disturbed. The Midway-Guam section has been damaged three times; twice from natural causes and once accidentally during some naval operations in Guam harbor. These are the only interruptions in nearly sixteen years, all temporary, the service meanwhile being maintained by the alternate routes.

The Canada-Australia cable is an available means of communication with the Orient; the route is from the Pacific Coast of Canada to and across Australia and by cable to Singapore and up the China Coast to Japan. This cable has been used freely in the last two years, but like all other cables it, too, soon became congested. Reciprocally the Commercial Pacific cable is an available means of communication with Australia and New Zealand.

Recently the radio has assisted in the relief of the Commercial Pacific cable, and it is likely to play a more important part in the future.

There still remain the Atlantic routes to the Far East by way of Europe. There are seventeen cables across the Atlantic. Only nine are in operation now, but all will be restored in time. One radio is working. There will be more.

Excepting only the Canada-Australia cable at Fanning Island, and the "Emden's" attack on Cocos Island, I doubt if any cables have been cut by the enemy. Many have been broken, but only from the wear and tear of four years, during which time it has been impossible to make repairs for lack of ships and the danger of exposing slow moving cable ships to the enemy. This has been especially true of the cables running south from England towards the East. Between 1900 and 1914 those systems were strengthened considerably by the laying of new cables on new routes. When the old cables are restored, as they will be, and supplemented by the new ones, the service to the Orient and Australia by way of Europe will be little, if any, inferior to the best that can be given in the Pacific.

Until the entry of the United States into the war there could have been no just complaint of the Pacific cable service. The causes which have operated to create delays and congestion in the last two years are the same as have operated all over the world. They came with the war. They will disappear with the war. The removal of war-time restrictions will reduce the traffic by more than one-half. Cable facilities in the Pacific are ample to deal expeditiously with any normal time traffic, and it is to be hoped the day is not distant when cablegrams filed in Japan this evening will be on your desks this morning, and the evening and the morning will again be the same day. This is a pious hope. Increased income is illusory, as the government takes about 83 per cent of the profit under the excess profits tax law.

## Navy Thanks Marconi.

At the Congressional hearing recently held in Washington on the bill for government control of radio communication, Captain Hooper prefaced his statement with the following complimentary allusions:

"Before going into the general subject, I do not think it would be out of the way that I should pay tribute to the fine co-operation and fine work of the radio manufacturers and inventors and amateurs in our country. When war came on we were totally unprepared to handle the entire situation. The amateurs saved the day when we had to man practically the entire merchant marine by naval radio operators in order to incorporate the merchant marine into the naval system.

"The manufacturers came down to Washington and placed themselves at our disposal, and in every way possible did their utmost to further the plans and slightest desires of the department. The inventors were keen and active in every effort in their research work to produce what might be used against our common enemy. I take particular pains to mention the assistance given by E. J. Nally, vice-president and general manager of the Marconi Wireless Telegraph Company of America, whose company more than any one else suffered through what war brought upon them; and also of the Federal Telegraph Company, which stood next in being harmed due to the government's closing the stations.

"These officers have performed a service as great as any military officer in the radio work for the government in time of war, and this service should be recognized in some way. They know in their consciences that they have done a great good to the country, the same as the soldiers and sailors have done; and it ought to go down in the records of history that they have done their duty.

"It has been the same with all the radio manufacturers. They have done their duty to a man. They have borrowed money, they have worked overtime, they have worked until they could not work any longer, in order to fill the needs of the navy. And it is our duty, now that the war is over, to see that they are properly rewarded; and I consider that a brief mention of this fact is not out of place in the hearings before this committee."

## Book on Alternating Currents.

Arithmetic of Alternating Currents, is the name of a new book by E. H. Crapper. For those who are familiar with elementary mathematics, this book will be found valuable as it describes in a thorough manner periodic and alternating currents; generation of alternating electromotive forces; inductances; inductive circuits; capacity and condensers; resistance, inductance and capacity in parallel; static transformers; induction motors and transformation of currents.

The book contains 208 pages. Price $1.25. Copies may be purchased from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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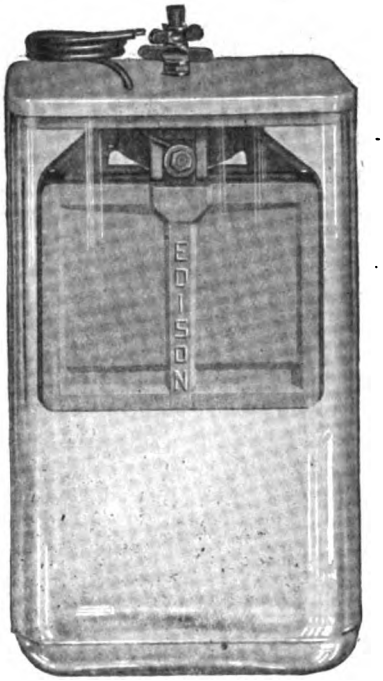


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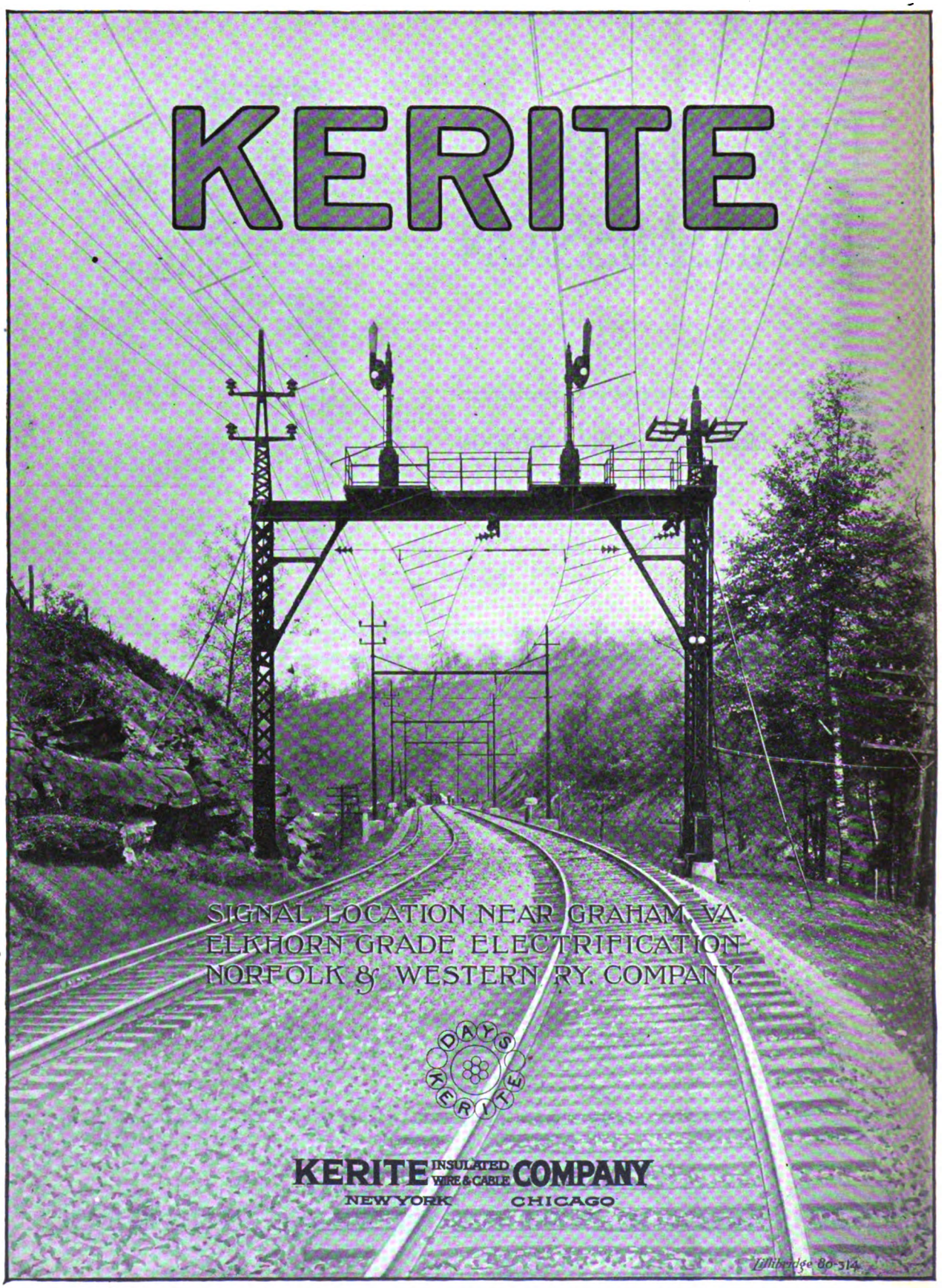


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## THE RAILROAD.

### Telegraph and Telephone Division of the American Railroad Association.

At a meeting of the executive committee of the Association of Railway Telegraph Superintendents, held in Washington, January 30, preliminary arrangements were made to amalgamate the association with the American Railroad Association as contemplated by Circular 70 of the Director General of Railroads. Following this meeting, President Martin H. Clapp of the Association of Railway Telegraph Superintendents, was authorized by the American Railroad Association to appoint a committee of direction of the telegraph and telephone division of the American Railroad Association, which division will take over the activities of the Association of Railway Telegraph Superintendents during the period of Federal control of the railroads. This committee of direction is composed of the following members: William Bennett of Chicago; J. F. Caskey, South Bethlehem, Pa.; G. A. Cellar, Pittsburgh; E. A. Chenery, St. Louis; M. H. Clapp, Washington; H. Hulatt, Montreal; J. A. Jones, Charlotte, N. C.; E. C. Keenan, New York and F. T. Wilbur, Chicago.

A meeting of this committee was held at the office of the American Railroad Association, 75 Church Street, New York, on February 20 at which all of the members were present except Messrs. Bennett and Hulatt who were unavoidably prevented from attending. The committee elected M. H. Clapp chairman and J. F. Caskey vice chairman. At this meeting regulations of the division were adopted. They provide that the membership of the division shall include those actively connected in an official or supervisory capacity with railroad telegraph or telephone work.

Affiliated members may be appointed by the committee of direction subject to the approval of the general committee of the section.

The representatives or members of the division shall annually select nine nominees for the committee of direction for presentation to the general committee of the operating section of which the telegraph and telephone division is a part. This committee of direction shall conduct the business of the division and the other detailed rules adopted at this meeting provide that the work of the division may be carried on in practically the same manner as the association work has heretofore been managed. In this connection the following special committees were appointed: Committee No. 1, Construction and Maintenance Outside Plant; Committee No. 2, Construction and Maintenance Inside Plant; Committee No. 3, Protection Against Electrolysis; Committee No. 4, Protection Against Lightning and Electric Light and Power Circuits; Committee No. 5, Telegraph and Telephone Development; Committee No. 6, Message Traffic.

Regular meetings of the committee of direction are to be held in March and September of each year. An annual meeting of the telegraph and telephone division is to be held in June each year, the time and place to be designated by the committee of direction. The meeting for this year will probably be held at the La Salle Hotel, Chicago, June 11, 12 and 13.

Regulations provide that special meetings may be held. After going over the details of the arrangements with the general secretary of the American Railroad Association, J. E. Fairbanks, the committee of direction of the telegraph and telephone division feels that the work formerly done by the Association of Railway Telegraph Superintendents will be very satisfactorily taken care of under the new arrangement which will have much greater force by reason of the connection with the American Railroad Association.

M. H. Clapp, president of the association, as well as chairman of the committee of direction of the telegraph and telephone division, proposes to advise the members of the association definitely regarding full details of the amalgamation and the new division.

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FRANK TREMBLE, superintendent of telegraph of the Texas and Pacific Railway, Dallas, Tex., was killed while riding on a railroad speeder, February 21.

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### Submarine Cable Working.

"Beginner's Manual of Submarine Cable Testing and Working," by G. M. Baines, is a book of 265 pages dealing in a thorough manner with the operation of submarine telegraphs.

The first four chapters contain elementary matter relating to batteries, electrical laws, etc. Chapter V. covers copper resistance of cable, instrumental zero, false zero, theory of false zero test; and in the following eighteen chapters up to date matter is incorporated explaining cable insulation tests, inductive capacity of cables, tests for broken cables, curb transmitter, mouse mill device, recorder adjustment and other matter which should form a part of every cable man's technical knowledge.

The price of the book is $4.50, and copies may be obtained from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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# EDUCATIONAL

## Telegraphy.

Continuing the subject of electromagnets we shall now consider how the magnetic strength of magnets is arrived at.

MAGNETO-MOTIVE FORCE.

An electric current whose unit strength, i, is magnetically equivalent to the magnetic polar unit generates, for each unit of current, $4\pi$ magnetic lines of force.

Since an ampere is one-tenth the unit current in the absolute system, it follows that 1 ampere generates $\frac{4\pi}{10} = 1.256$ lines of force.

As proven by experiment, a current of 10 amperes with 50 turns in a coil has the same magnetic power as a current of 5 amperes with 100 turns, or of 1 ampere with 500 turns. The product $10 \times 50 = 5 \times 100 = 1 \times 500$ is designated as ampere turns.

One ampere generates on each centimeter of its length $4\pi/10 = 0.4\pi$ lines of force; therefore $I$ amperes in $N$ turns develop $\frac{4\pi}{10} N I$ lines of force. This product is called magnetizing or magneto-motive force, and is usually designated by the symbol *M.M.F.*

On the inside of the coil (solenoid) the field strength, $H, = \frac{4\pi \times I \times N}{10 \times L}$, where $L$ is the length of the coil in centimeters.

For a circular current path of radius, $r$, the field strength at the center of the circle,

$$H, = \frac{2\pi i}{r}$$

If we have instead of a single turn, $N$ turns, which compose a coil, whose length and thickness compared with its diameter are small, then at the middle point $H = \frac{2\pi N i}{r}$.

If the current is given in amperes, then

$$H = \frac{2\pi N i}{10 r}.$$

## Telephony.

As a resume of the matter presented in the past four or five lessons in telephony dealing with the equipment of central offices, we quote from the technical instructions embodied in Plant Course No. 5, of the Mountain States Telephone and Telegraph Company.

Central offices may be divided into two classes—magneto and common battery. A magneto central office is one, the subscribers' line of which employ magneto or local battery telephone sets. Each station connected to a magneto central office must have a local battery at the station for supplying current to the transmitter and a hand generator for signaling the central office operator. A common battery central office is one which supplies, from a battery located at the office, current to the transmitters and current for signaling the central office, to all the sets connected to that office which are within a distance over which sufficient current may be supplied over the line wires to the transmitters. These sets require no local battery or hand generator and are called common battery sets because they receive their electrical energy from the central office battery which is a common source of current supply for practically all the sets connected to that office. Stations connected to a common battery central office which are at such a distance from the office that the line is over a certain limiting resistance, which varies with conditions, will not receive a sufficient amount of current from the office battery for satisfactory operation of the transmitters, so that local batteries have to be placed at these stations to supply the transmitters with current. If these stations are not beyond the limit of common battery signaling, which can be done over a much greater distance than sufficient common battery transmitter current can be supplied, they will use local-battery-talking common-battery-signaling sets. If any stations are beyond the limit of common battery signaling they must use regular magneto subscribers' sets, and be connected to special magneto equipment at the central office. It is thus seen that the common battery central office may have connected to it, local-battery talking common-battery signaling sets and magneto sets as well as common battery sets. The two former classes of sets, when connected to a common battery office are, of course, on rural lines or at stations which are a great distance from the office. The magneto office can only have magneto sets connected to it.

The equipment of the magneto central office, since it does not supply any current to the stations, and is used only for a few lines, is comparatively simple. The common battery central office, on the other hand, may serve a great many lines besides supplying transmitter current to practically all of them. The

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common battery principle permits of the use of many automatic features, such as signaling the central office by simply removing the receiver, automatic operation of the supervisory (cord) signals, automatic or machine ringing, etc., so that the common battery central office apparatus and circuits become very complicated. The common battery system permits of the substation equipment being very simple and compact and locating at the central office all equipment requiring skilled operators and workmen for its operation and maintenance.

## Radio Telegraphy.

THE ULTRAUDION.

By a slight modification of radio receiver circuits, or with certain bulbs by mere adjustment of the filament-heating current and B battery potential, the audion becomes a detector of undamped waves, of extraordinary sensitiveness. Under such conditions the audion becomes a generator of continuous oscillations of constant amplitude. The power thus generated varies from the order of a microwatt in small bulbs to tens of watts in bulbs three inches in diameter or larger, consuming from two to three amperes in the filament circuit and energized by a B battery potential of several hundred volts.

To an audion in this oscillating condition Dr. Lee deForest gave the name "ultraudion," descriptive of the ultra sensitive response which it then gives to incoming electromagnetic waves. Whether the waves be of damped or undamped characteristics, the sensitiveness of the ordinary audion is greatly enhanced—from tenfold to fiftyfold—according to quality of the individual bulb and of the particular circuit combination being used.

The ultraudion state was discovered while a bulb connected in the ordinary manner was being used (see Fig. 1, page 93, February 16 issue), that is, with a secondary receiver circuit connected across the grid and filament. The filament was heated to an unusual degree, thereby reducing the internal resistance of the bulb, and the capacity of the condenser *S* in series with the grid (known as the stopping condenser) was made extremely small, of the order of 0.0001 microfarad.

While testing this bulb with an arc transmitter station it was observed that, at a certain adjustment of the filament current and the B battery, the customary rough hissing sound due to the irregularities of the arc of the distant transmitter was suddenly replaced by a faint flute-like whistle. The pitch of this note, it was observed, could be varied at will simply by varying the capacity of the condenser in shunt with the secondary of the receiver transformer. (The condenser with the arrow in Fig. 1, February 16 issue.)

It was apparent, therefore, that here was a tiny generator of undamped oscillations the period of which could be controlled within limits by varying the constants of the closed circuit, and to a certain degree by regulating the filament current.

Later while experimenting with the audion amplifier as a relay for telephone currents and weak radio signals, Dr. deForest found that with two bulbs connected in cascade, the ultraudion condition could be more readily produced, owing to the tendency of the impulses set up in the second audion to react upon the first, through the coupling transformer or associated circuits.

The action of the second audion is almost invariably to amplify the impressed high-frequency currents, so that in a telephone receiver connected in the usual way between the plate and the B battery of the second audion a beat-note of surprising intensity is heard. The pitch of this note can be run through the entire gamut of audibility down to a low guttural note, then lapsing into inaudibility as the two oscillating circuits are brought into nearly exact resonance, then rising higher and higher as one or the other circuit is again detuned. The power represented in this beat-note is many hundred times greater than the initial high-frequency power in either oscillating circuit alone.

This lesson should be read over two or three times and studied in connection with diagram 1, page 93, in the February 16 issue of TELEGRAPH AND TELEPHONE AGE.

## Efficiency Engineering.

*(Continued from page 94, February 16 issue.)*

It is very important that a manager of a telegraph or telephone office or a chief operator of an operating room when appointed to a new position should impress favorably all with whom he comes in contact when he assumes his new duties. If he fails to do this he will have a difficult task before him in living down unfavorable impressions. If he has a dozen or a hundred subordinates everyone of them is eyeing him critically, not with a view of finding objections but mainly for the purpose of forming an impression of the new official. The first few days are trying ones when a man has assumed a position under such conditions. He is being weighed and judged from every angle. If he survives the criticism his future work will be easy. Everyone with common consent will reach the same

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conclusion that he is the right man in the right place and all will be cooperating with him to make his administration a success. It is well known that constructive cooperation beats destructive competition. The same is true in a telegraph or telephone office where competition governs the action of the individual. He naturally wishes to advance and he competes with his associates in his efforts to forge ahead. Destructive competition is best illustrated in its application to individual efforts by the assertion of someone who stated that a man in his mad efforts to override his associates had destroyed the competitive spirit that prevailed in the office and had substituted in its place an ill feeling that permeated the entire department. This is all wrong. Honorable dealings and strict fairness ought to actuate every individual, and without these qualifications no man should expect to survive the ordeals incident to individual competition.

Recent army tests incident to war conditions developed the astonishing fact that of those examined nearly 45 per cent. fell below the average intelligence grade. The rating and proportions were:—

Very superior intelligence—Four to 5 per cent. of a quota, comprising men of marked intellectuality.

Superior intelligence—Eight to 10 per cent., the men comprising many of the commissioned officer type and a large amount of non-commissioned officer material.

High average intelligence—Fifteen to 18 per cent.

Average intelligence—About 25 per cent., offering excellent private material and some non-commissioned officer material.

Low average intelligence—About 20 per cent., these men usually making good privates and proving satisfactory in routine work.

Inferior intelligence—About 15 per cent; men likely to prove fair soldiers, but slow in learning and rarely rising above the rank of private.

Very inferior intelligence—The majority of these are below ten years in mental age.

Among the army professions the engineer and medical officers rank at the top in mental alertness, while of men of other vocations telegraphers took a high standing. Army chaplains also proved highly intelligent, receiving high percentages in the language tests especially.

This is a gratifying report and it will be received by the telegraph profession everywhere with satisfaction. It proves as we have always contended that the telegraph service makes men alert. It sharpens their judgment. It gives them snap and it qualifies them to rank with the ablest in all professions. A telegrapher at the key is brought in daily contact with business transactions of every nature. He has to have a good memory and act quickly whenever he is confronted with difficult problems. This makes him careful, accurate and reliable. This is repeatedly proven by those who leave the telegraph service and embark in other professions. When this happens the former telegrapher soon forges to the front and he makes a success of whatever he has undertaken as his future work. He carries with him into his new field of endeavor the alertness that he acquired at the key.

(*To be continued.*)

## New York Electrical Society.

At the 371st meeting of the New York Electrical Society, held February 19, A. Russell Bond, managing editor of the *Scientific American,* New York, delivered a lecture entitled "Deep Sea Salvage After the War." Mr. Bond told about plans under way for salvaging some of the fifteen million tons of allied and neutral shipping sunk since August 1, 1914.

HARRY HAGEN, in the service of the Anglo-American Telegraph Company at St. Pierre, Miquelon, writes us that at his station the visitations of TELEGRAPH AND TELEPHONE AGE are always looked forward to with pleasure.

## International Association of Municipal Electricians.

Clarence R. George, secretary of the International Association of Municipal Electricians, Houston, Tex., is busily engaged in the preparation of the annual printed proceedings covering the Atlanta, Ga., convention, held last September. The book will contain much valuable information to those engaged in municipal affairs. Charles E. Diehl of Harrisburg, Pa., is president of the association.

## INDUSTRIAL.

F. W. ROEBLING, JR., head of the engineering branch of John A. Roebling's Sons Company, Trenton, N. J., manufacturer of wires, cables, etc., is suffering from a nervous breakdown, and has gone to a private sanatorium near Philadelphia for a prolonged rest.

## Recording Elapsed Time.

The use of toll circuits is the stock in trade of the telephone company. It is that which the company sells to the public at so much per minute, and as such it represents money just as fully as does the stock carried by any merchant.

The public should pay for all it takes. And the public has no objection to paying for all it gets, provided the amount of the commodity involved has been determined in an unquestionable manner.

For this purpose the use of the calculagraph in telephone exchanges, large or small, is indispensable.

## Single Line Repeaters.

As an instance of the invasion of the foreign telegraph field by American telegraph apparatus, it is interesting to learn that the type of single line telegraph repeater manufactured by the Jester-Cooper Company, of Houston, Tex., is meeting with favor in Latin-American countries. This repeater is giving such good service on lines in the United States that its users do not hesitate to recommend it.

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## Variance of Measuring Instruments and Its Relation to Accuracy and Sensitivity.

BY FREDERICK J. SCHLINK, ASSOCIATE PHYSICIST, UNITED STATES BUREAU OF STANDARDS.

[ABSTRACT.]

Instrumental variance, which forms the major part of the discussion of this paper, is a factor whose effect in causing error in measuring instruments has hitherto been given but little consideration. In order to bring out the essential relations of variance characteristic, the paper opens with a discussion of accuracy and sensitivity, showing how each of these terms can be given precise definition with definite numerical significance. Such values when determined have important use in establishing the figure of merit or value of a given instrument or type of instrument. A distinction is drawn between the commercial accuracy commonly called for in direct reading instruments of the shop and plant, and the higher grade of accuracy required in the laboratory where commercial indications are normally subject to the application of corrections for error of calibration.

The error arising from whatever source, observed in an indication of the instrument, divided by the true value of the measured quantity, may be termed the inaccuracy at a given reading, the negative term being justifiable on the basis of custom and ease in application. The accuracy will be the reciprocal of the quantity just defined. The observed error of an instrument (or the correction) is utilized for adjusting observations before their use in calculation, while the inaccuracy and accuracy find their utilization in rating the quality or performance of the instrument.

An instrument is understood to be sensitive when it shows a change of reading for any change in the quantity being measured, a definition having little significance until means are available for expressing the sensitiveness numerically. Attention is called to the common inconsistencies in the sensitiveness ratings of familiar instruments and the suggestion is made that the unit of response, which is referred to the unit of change in the measured quantity in establishing the value of the sensitivity, should be based upon a definite and inherent characteristic of the instrument rather than upon an accidental factor such as the length of a pointer or an arbitrarily graduated scale. Thus in the case of an analytical balance, sensitivity should be referred, not to motion at the tip of the pointer but to the angular deflection of the beam (or pointer), so that comparison can be made of the true equilibrium properties of balances without reference to the accidental and unimportant factor of pointer length, which, within reasonable limits, is alterable at will. In a balance then the sensitivity would be determined as the angular deflection of the rest position of the beam per unit addition of load to the load pan, the first expressed in radians and the second in grams.

The necessity for distinguishing between insensitiveness and passiveness or sluggishness in an instrument is shown and consideration is given to the effect of friction in preventing response to certain small changes in the measured quantity, such that if the usual definition of sensitivity were accepted, we would find a phase of zero sensitivity followed by one of finite sensitivity, consequent upon the overcoming of the static friction which tends to prevent immediate response. Such a discontinuity in the value of sensitivity being irrational, in view of such a determination being dependent upon the absolute rather than the relative values of the quantities entering into the observation, we must modify our definition of sensitivity to this form: sensitivity in an instrument is the rate of change in the indication of such instrument with respect to change in the quantity being measured, it being necessarily assumed for the purposes of this definition that friction and lost motion in the mechanism have been eliminated or are negligible. The amount of the least alteration in the value of the measured quantity, producing instrumental response, divided by the initial value of the measured quantity may be called the passivity of the instrument at that point. Passiveness is a special case of the phenomenon of variance, next discussed.

Variance is defined as the range, at any given value of the measured quantity, or variation in reading which may be exhibited by the instrument under repeated application of the same value of the quantity being measured after a steady reading has been attained,—the environment remaining unchanged.

The specific variance or variancy may be defined as the ratio of the range, at any given value of the measured quantity, of variation in reading which may be exhibited by the instrument under repeated application of the same value of the quantity being measured,—divided by the measured quantity itself, the same assumptions applying as above as to the attainment of a steady state of indication and as to the maintenance of unchanged environment.

Determination of the variance is a most important part of the calibration of an instrument and appreciable error may arise from failure to recognize or express it. The paper illustrates the derivation of the variance from the hysteresis loop obtained when an instrument is subjected to a complete cycle of operation from a lower to a higher indication, and return,—while plotting point by point the instrumental readings (or corrections, or errors) against actual values of the quantity being measured. The importance of a study of this loop in analyzing instrument performance is shown, and figures are presented to exemplify the type and magnitude of the effect.

The sources of this hysteresis phenomenon are discussed, including the inelastic actions of certain force-equilibrating elements, and, at greater length, the purely mechanistic cause comprised in backlash. In illustrating this latter defect, the importance of maintaining constant or definite space relationships in the instrument linkwork is set forth, and detailed consideration is given to one of the most common causes of imperfect reversibility in instruments, that of the shifting zone of contact in a bearing whose journal fits in a slack or imperfectly constrained

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manner. The existence of mechanistic causes of irreversibility quite distinct from the ordinary concept of backlash is demonstrated, in the rolling of the pin or journal about the interior face of its slack bearing in a significant and fairly definite manner, capable of kinematic analysis and accounting satisfactorily for phenomena usually ascribed to the operation of frictional resistances simply. It is shown moreover that this cause produces an actual alteration and variation of the magnification or displacement ratio of the instrument from the point of reception to the point of registration of the quantity being measured.

The frequency curve method of delineation is applied to the expression of variance of an irregular nature, as found in instruments exhibiting bad workmanship or ill repair, and it is seen that the variance characteristic of such an instrument can be completely defined by reference to a family of frequency curves obtained in the following manner: One series of points will be plotted for readings taken at varying rates and amounts of increase of the measured quantity terminating in the value corresponding to the particular point of the scale under investigation, and another set for decreasing values terminating at the same point. Such a curve, in which frequency of occurrence of a particular reading or error is plotted against the true value of the measured quantity at that reading, gives the probability of occurrence of any amount of variation from, say, the mean instrumental reading.

Far from being a relatively unimportant source of inaccuracy in measuring instruments, it can be shown that the hysteresis or variance type of error demands consideration in practically every type of instrument, while in some (such as pointer-and-dial types of displacement-indicators) it is a preponderating factor in design and actually limits the application or utility of the instrument and sets the limit of sensitivity and accuracy practicably to be obtained.

Only brief consideration is given to the phenomenon of instrumental drift, which, having its source usually in elastic after-effects, requires special treatment from the point of view of the elastician.

A few means of reducing instrumental variance are given, including the use of special types of bearings in which slack or clearance can be reduced to a minimum without impairing easy operation; and the use of flexible elastic connectors between elements of the linkwork, instead of gears and racks or pin-and-link connectors. Such tape-like connectors which may wind on cam-shaped members to provide for correction of displacements to a linearly graduated scale, exhibit excellent properties in the matter of reversibility of calibration, and have important advantages over the more usual types of linkwork details.

The action of vibration in reducing instrumental variance is found to accord well with the principles previously set down, and it appears that, within limits, errors of result due to mechanical sources of variance can be considerably reduced by judiciously applied vilbration treatment.

In designing and constructing an instrument, due consideration should be given to the effect of variance errors in practically limiting the sensitivity to be sought in adjustment, as well as the interval between the graduations and the smallness of the units of graduation. It is suggested that in view of this condition, the mean interval of graduation of laboratory instruments should not be less than five times the mean variance, while for commercial or plant instruments the ratio of mean scale interval to mean variance may be of the order of two to one. Likewise the sensitivity may easily be disadvantageously high, inducing erroneous estimates of the precision of results and requiring special care in the calibration and use of the instrument.

The factors of maximum or mean inaccuracy, (or accuracy) sensitivity, variancy and specific set (the amount by which the variance loop may fail of closure, divided by the range of the deflection cycle) may be referred to the total range of graduation instead of to particular values of the measured quantity under observation, as a convenient means of arriving at single significant numbers to be composed into a "figure of merit" for an instrument whose characteristics are being determined.

## The Measurement of Insulation Resistance.

BY UNCLE GEORGE

I had put Billy Wright, a new man, to work on the insulation tests on Sunday, and although I knew he was not thoroughly familiar with those tests I felt sure he would be at me next day with a grist of questions.

Sure enough, on Monday he came to me and said: "Boss, I know how to take an insulation test with a voltmeter, and know the formula for figuring the megohms per mile, but I don't thoroughly understand the test. Will you give me some time, please?"

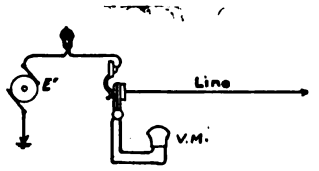


FIGURE 1

If there is one thing I enjoy more than another, it is to have one of the boys ask for help when I know that he has first honestly tried to help himself. That man will get somewhere—much farther than the one who learns enough to "get by" and lets it go at that. Too many wire chiefs are wasting their time and rendering an indifferent service to the company employing them because they are unwilling to admit that there is anything more for them to learn. If, like Billy Wright, they would take their problems to the boss, they would soon find themselves growing in an art which requires the best a man can give, and returns to the one who gives his

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best a reward beyond the salary he receives.

I took Wright to the blackboard which is on the wall for just such explanations, and I drew for him the sketch (Fig. 1), writing beneath it the formula and an example in which figures were substituted for letters:

$$\frac{\left(\frac{V}{d} - 1\right) R\, M}{1{,}000{,}000} = \text{megohms per mile.}$$

$V$=voltage.
$d$=deflections.
$R$=resistance of voltmeter.
$M$=length of wire in miles.

$$10)\,100$$
$$10$$
$$-\,1$$
$$9 \times 100{,}000 = 900{,}000 \times 100 = \frac{90{,}000{,}000}{1{,}000{,}000} = 90 \text{ megohms.}$$

"Now, Wright, you know that the fall of potential across any part of the resistance of a circuit is the same proportion of the whole voltage as the resistance through which it falls is of the total resistance. Knowing this you can readily see that, using a 100,000 ohm voltmeter and 100 volts, a 10 volt deflection of the voltmeter needle indicates that 100,000 ohms is one-tenth of the total resistance of the circuit from $A$ to $B$.

If the resistance of the voltmeter, 100,000 ohms, is one-tenth, then the remainder of the circuit and the leaks to the ground must be the other nine-tenths, or nine times 100,000 ohms."

"I now see," said Wright, "why we deduct 1—that is the one-tenth—the voltmeter resistance, and as we are not trying to find the insulation resistance of the voltmeter we deduct it and compute the balance of the circuit."

"That is right," said I, "and no matter what the deflection may be, the 1 you deduct is that fraction of the whole circuit which is the resistance of the voltmeter. For example: If the deflection had been 2, instead of 10, then $\frac{100}{2} = 50 - 1 = 49$. In this case the voltmeter resistance is one-fiftieth of the total resistance and we deduct it from the fifty-fiftieths, the total circuit, leaving the forty-nine-fiftieths, the part of the circuit on which we wish to know the insulation resistance."

"Another point not clear to me," said Wright, "is why we multiply the resistance of the circuit, exclusive of the voltmeter resistance, by the number of miles of wire to get the average megohms per mile of insulation resistance. It seems we should divide to get an average."

"To answer that," said I, "I shall draw you this little four mile line (Fig. 2) and put a 1,000 ohm leak on each mile of it.

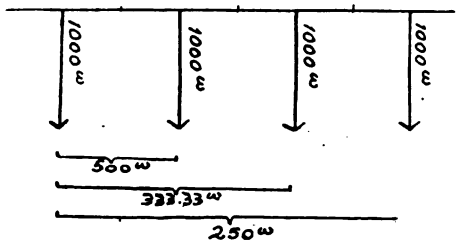


FIGURE 2

"Now, if we wish to know the resistance of the leak for one mile when we have 250 ohms as the joint resistance of the leaks on four miles, we must multiply that joint resistance by the number of miles, four; thus, you see, we obtain the resistance of the leak on one mile. Now on our 100 mile line the resistance of the numerous paths between the wire and the ground varies. On some of these individual miles there may be rather good paths to the ground and on others very high resistance paths, but as we are seeking to find the average insulation resistance per mile in megohms, we multiply the joint resistance of all the paths, 900,000 ohms, by 100, the number of miles of wire, and divide the result by 1,000,000 to reduce the figure to megohms.

"You can readily see that if at any point on this wire of a hundred miles there should be a number of broken insulators, or the wire were in contact with the foliage of trees, even if the insulation of the remainder of the line were practically perfect, the result obtained by this measurement would, on account of the bad spot, give a lower figure for the entire line."

## A Human Duplex.

R. B. Chase, wire chief in the relay office of the Chicago, Burlington and Quincy Railroad at Burlington, Iowa, recently had handed to him a telegram with two addresses, Chariton, Ia., and Chicago, Ill. Mr. Chase, at the switchboard, called Chicago on one wire and Chariton on another wire. As does not happen very often both offices answered the call at the same time. However, not to be outdone by such promptness Mr. Chase with his right hand sent the message to Chicago and with his left hand simultaneously sent the message to Chariton. Manager W. A. Partridge of the Burlington office vouches for the performance as stated, and adds that Mr. Chase does not "see double" nor has he twins at home.

## There Is No Limit.

The authorities of Macon, Ga., are making an attempt to impose a license charge of $300 against one of the telegraph companies for the maintenance of a branch telegraph office in that city.

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## Large Gathering of Telegraph and Telephone Engineers.

At the midwinter convention of the American Institute of Electrical Engineers, held in the Engineering Building, New York, February 19, 20 and 21, the forenoon session on Friday, the 21st, was devoted to the presentation and discussion of important papers prepared by telegraph and telephone engineers.

At this session there were present about four hundred engineers engaged in the communication services.

After the opening of business President C. A. Adams of the Institute turned the conduct of the meeting over to Donald McNicol, Chairman of the Committee on Telegraphy and Telephony.

The first paper presented was "Radio Telephony," by Messrs. E. B. Craft and E. H. Colpitts, of the Western Electric Company. This paper is very thorough, describing the vast strides made during the late war in developing radio telephone apparatus for the use of the American forces in the field; especially as applied to telephoning between ground stations and flying aeroplanes.

The second paper was presented by John R. Carson, of the American Telephone and Telegraph Company, entitled "Theory of the Transient Oscillations of Electrical Networks and Transmission Systems."

A paper entitled "Telephone Circuits With Zero Induction," written by W. W. Crawford, of Colorado College, was presented by the Chairman of the meeting.

The discussion of these papers by the members brought out a large amount of interesting historical and technical information. The discussion of the paper on "Radio Telephony" was opened by Major General G. O. Squier, Chief Signal Officer of the Army. General Squier, after paying high tribute to the engineers who had devoted their talents and energies to the problems presented at the beginning of the war, centered his remarks around the present and future needs related to the hooking up of radio systems to submarine cable lines. As the head of the Signal Office General Squier offered to cooperate in any way with inventors and engineers who bring forward practicable suggestions for improvement in cable operation.

Dr. M. I. Pupin, of Columbia University, in discussing this paper, stated that the Boards of Directors of the American Telephone and Telegraph Company and of the Western Electric Company performed a national service of the highest order when they established the research laboratories which have within the past few years produced so many revolutionizing telegraphic and telephonic advances.

In his remarks specifically about the vacuum bulb devices used in radio signaling, Dr. Pupin took occasion to pay a deserved tribute to Dr. Lee deForest, the American inventor, who started the wonderful chain of radio developments which followed the invention of the vacuum tube, by introducing the third member as an element of the audion.

Discussing Mr. Carson's paper Dr. Pupin presented from memory a historical review of the theoretical work carried on during the past eighteen years in evaluating the transient currents existing in telephone circuits, pointing out that Mr. Carson, in his paper, has for the first time presented workable methods of determining clearly the extent of and significance of transient current phenomena in electrical circuits.

Among the telegraph and telephone engineers present at this meeting were:

American Telephone and Telegraph Company: O. B. Blackwell, John R. Carson, L. Espenschied, H. S. Osborne, G. A. Campbell, C. A. Robinson, H. A. Affel, R. S. Hoyt, W. H. Martin, L. P. Ferris and A. B. Clark; Western Electric Company: F. B. Jewett, E. B. Craft, E. H. Colpitts, W. M. Hendry, H. W. Nichols, H. J. van der Bijl, J. H. Bell, A. J. Eaves, E. C. Scriven, H. F. Kortheuer, C. R. Moore, R. A. Heising, H. D. Arnold, B. W. Kendall and John Mills; Western Union Telegraph Company: R. E. Chetwood, E. R. Schute, D. H. Cameron, W. C. Peterman, A. P. Achimore, and Bruce Beardsley. Others present were: Lieut. Col. J. O. Mauborgne, F. A. Wolff, Erich Hausman, Arthur Bessey Smith, J. H. Morecroft and Charles F. Harding.

## Willis Jones Makes Another Discovery.

In the February 1 issue of TELEGRAPH AND TELEPHONE AGE was described a discovery recently made by Willis Jones. The discovery had something to do with Mrs. Willis Jones' ideas about the utility of technical literature. Yes, there is a Mrs. Willis Jones, and she has some very definite ideas relating to various subjects; especially in regard to her most obedient subject—Willis H. Jones.

In explanation of why Mr. Jones did not promptly receive his copies of TELEGRAPH AND TELEGRAPH AGE, Mrs. Jones says: "He did not receive the copies of the AGE he claims were lost, because he is so full of electricity that the sparks he emits blind somewhat his vision, and he perhaps never would have found them had he not (after voicing a growl) consented to go to the cellar for a scuttle of coal. Yes, woman's brain no doubt is wonderful, very likely so designed for her protection. Somehow she seems able to figure out 'mere' man's curves even before he begins to suspect that he can use them."

At the beginning of chapter thirteen in Mr. Jones' book he makes use of the quotation "If 'twere done when 'tis done, 'twere well 'twere done quickly." Apparently he has not concluded that this applies to the bringing in of the evening's fuel.

## Petruchio Feared Not the Vibroplex.

In "The Taming of the Shrew," the bard of Avon gives Petruchio an opportunity to ask questions which would suggest that the gentleman of Verona considered himself a top-notch hand sender.

While speaking to one of the servants, Petruchio asks: "Think you a little din can daunt mine ears? Tush, tush, fear boys with bugs?"

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## THE TELEPHONE.

K. T. LONG has been appointed assistant general manager of the China Electric Company at Shanghai, China. Mr. Long has been acting as superintendent of the Chinese telephone administration.

IN THE SERVICE of the Bell Telephone Company of Pennsylvania, J. A. Cadwallader has been appointed division transmission engineer.

THE CHARLESTON AND WHEELING division plant offices of the Chesapeake and Potomac Telephone Company have been consolidated. E. F. Hill has been appointed division plant superintendent at Charleston; V. B. Fitzpatrick, division plant engineer at Wheeling, taking up the duties of district plant supervisor; W. S. Gardner has been appointed district plant supervisor at Charleston.

THE PERRY COUNTY TELEPHONE COMPANY of New Lexington, Ohio, has increased its capital stock from $75,000 to $125,000.

THE MACKAY TELEGRAPH-CABLE COMPANY is gradually extending its network of long distance telephone lines throughout the south and southwest.

THE FREMONT HOME TELEPHONE COMPANY of Fremont, Ohio, has decided to make extensive improvements in its plant and office equipment to the extent of about $100,000.

### Submarine Telephone Cable Across Puget Sound.

The joint meeting of the Portland Sections of the National Electric Light Association and American Institute of Electrical Engineers, held at Library Hall, Portland, Ore., on Feb. 4, was well attended. The feature of the meeting was a paper by H. J. Sheppard, of Seattle, Wash., giving an interesting description of the installation of a deep-water submarine telephone cable across Puget Sound, for service between Seattle and the Navy Yards at Bremerton, by the Pacific Telephone and Telegraph Company. The matter was illustrated by lantern slides and moving pictures. This cable was laid in water 800 ft. deep and it is reported to be the longest submarine telephone cable in use in the United States. It was laid across four bodies of water, all different sections of the Sound, the cable weighing 9 lb. to the lineal foot. Steam tugs, equipped with donkey engines for operating the cable reel, were utilized in the work. There was also installed on the tug a motor-generator set to enable operators to apply electric brake control to the cable reel.

The old wire chief inquires: "Do you ever write a friendly and cheering letter to an old-timer friend, now retired? When you are an old-timer and retired, do you not think you should like occasionally to receive a letter from the youngster who then occupies the position you now fill?"

## CANADIAN NOTES.

GEORGE D. PERRY, general manager of the Great North Western Telegraph Company, was on February 21, married to Mrs. Josephine Ruth De Witt, the ceremony taking place in Toronto.

R. F. EASSON, a pioneer of the telegraph service and who since the introduction of the telegraph in Canada held many important official positions with Canadian telegraph companies, is now in his eighty-first year and living in retirement in Toronto.

GEORGE E. FLANNERY, traffic chief of the Canadian Pacific Railway Company's Telegraph, was a recent New York visitor. He was accompanied by his daughter Margaret. While in New York Mr. Flannery called upon a number of telegraph officials.

### Telegraph Rates in Ceylon Increased.

A general increase in the telegraph rates in the Island of Ceylon was inaugurated effective November 18, 1918. The lines are owned by the government and the rate has been increased from a unit charge of twenty-five rupee cents to forty cents for ten words, including the address. This means an increase of sixty per cent. on the minimum charge, but the rate for additional words remains the same, that is, five rupee cents for each additional two words or less.


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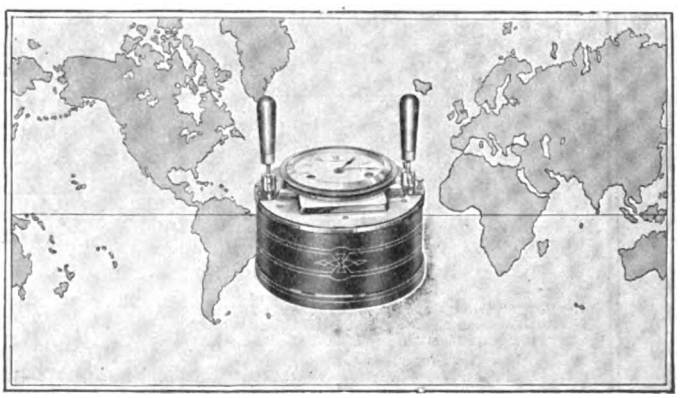

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THE WESTERN UNION MULTIPLEX.—The Western Union Multiplex system is completely described in a neat pamphlet just brought out by TELEGRAPH AND TELEPHONE AGE. The description of the system has been revised and brought up to date and the work is fully illustrated with views of the different pieces of apparatus. It was gotten up primarily as an appendix to Jones' Pocket Edition of Diagrams and Complete Information for Telegraph Engineers and Students, but some copies have been bound separately for the use of those who wish to carry it apart from the parent book as a matter of convenience. It will be found very serviceable to those who are studying and operating the Multiplex. The price of the pamphlet is 35 cents per copy. Send orders to TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

PHILLIPS' CODE has been recently revised and brought up to date. This standard code is in daily use by the press associations and by hundreds of commercial operators all over the country, and is the standard form of telegraph abbreviations. Anyone familiar with Phillips' Code can report meetings, sermons, addresses, speeches, etc. Price $1.00 per copy. For sale by TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

JONES' BOOK OF TELEGRAPH INFORMATION AND DIAGRAMS.—Every operator who wishes to get away from the operating desk should prepare himself for a better position, and there is nothing better to study than "Pocket Edition of Diagrams and Complete Information for Telegraph Engineers and Students," by Willis H. Jones. The present edition of this book was issued in April, 1918. It contains 488 pages, 250 illustrations and 64 chapters, including a 24-page appendix illustrating and describing the new Western Union Multiplex System. The book explains clearly the equipment of a modern telegraph office, and everything that a telegraph engineer or student should know. It is written in an easy, conversational style, and is interesting as well as instructive. The price of the work is $2.00 per copy. Send orders to TELEGRAPH AND TELEPHONE AGE, 253 Broadway New York.

EASY LESSONS IN TELEGRAPHY.—Every operator who desires to know the technicalities of the telegraph should possess a copy of "Correspondence Lessons in Technical Telegraphy," by J. H. Penman. This book tells its story in an easy and interesting way. It is just like personal instruction to study this excellent book and it is easy for the novice. Price $2.00 per copy. Address TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

RADIOTELEGRAPHY.—An excellent exposition of the principles and practice of radiotelegraphy is "Radiotelegraphy," a book of 135 pages and many diagrams. This book is revised to date, and is used for the instruction of the United States Signal Corps. It is a government publication and is therefore official and authoritative and concise and comprehensive. Price 60 cents per copy. Copies may be obtained of TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.


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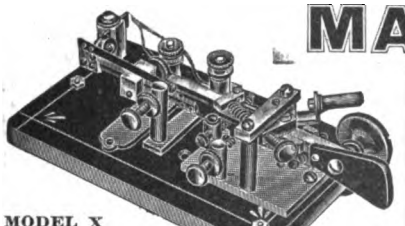

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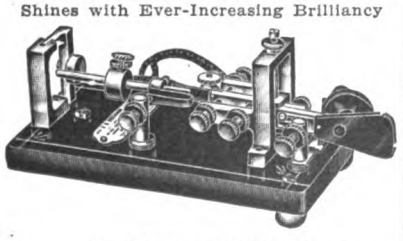

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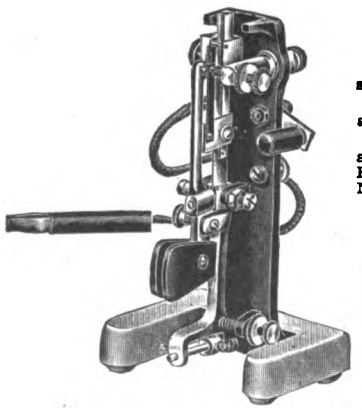

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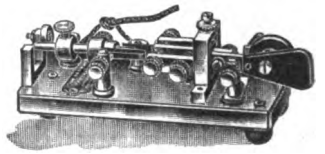

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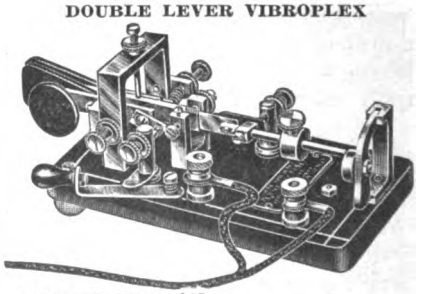

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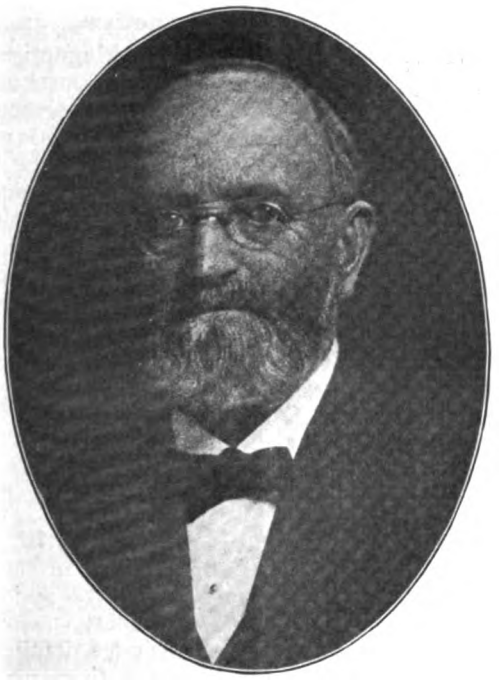
## Henry A. Reed Celebrates His Ninetieth Birthday.

On February 11, Henry A. Reed, president of the Bishop Gutta Percha Company, celebrated his ninetieth birthday. His son, Henry D. Reed, vice-president of the same company, was born on his father's fortieth birthday, so the celebration was a joint one. Henry A. Reed and his wife reside at Newark, N. J.

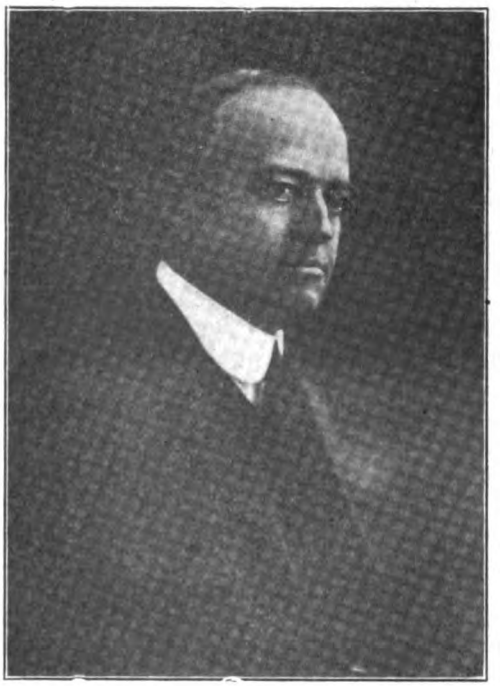
Henry A. Reed was born in Carmel, Putnam County, N. Y., February 11, 1829, and has had a long and active career. At the age of seventeen he began teaching in the Carmel district school, and when twenty, while still teaching, he learned telegraphy and was placed in charge of the Carmel telegraph office, July 1, 1849. One year later he opened a telegraph office at Croton Falls, the first on the



HENRY A. REED.

Harlem Railroad, and was on July 1, 1850, transferred to Hudson, where he remained two years and witnessed the first railroad train that ran from New York to Albany on the Hudson River Railroad. In 1852 he was appointed operator in the New York office of the New York, Albany and Buffalo Telegraph Company, at which time three operators took care of all their New York telegraph business. In 1853, Mr. Reed was placed in charge of the Poughkeepsie office of this company.

He came to New York in 1878 and assisted in the management of the estate of Mrs. Samuel C. Bishop, which was operating the Bishop Gutta Percha Works, and which was threatened with a law suit for infringement of the Simpson patent, covering the use of gutta percha as insulation. A similar action had been brought successfully against the Western Union Telegraph Company, but the data collected and prepared by Mr. Reed caused the plaintiffs to withdraw their suit against the Bishop Company. In 1885 he was made secretary of the Bishop Gutta Percha Company by the legatees of Mrs. Bishop, and in 1887 became general manager, and at once bent his energies to build up the business, which was rapidly decreasing. Mr. Reed has always taken an interest in electrical affairs and keeps well posted on the development of the industry. He foresaw that rubber would be a much better insulator for any conductors that were to be used anywhere except under water, and at once engaged an experienced engineer to design and install machinery to insulate wire and cables with rubber. In 1887 Mr. Reed was called in consultation by the United States Light House Board, which was engaged in devising a system for lighting river channels by lighted buoys and range lights. In 1888 he



HENRY D. REED.

designed and furnished the first high tension cables to be used underground. In 1905 Mr. Reed became president of the Bishop Gutta Percha Company. He was one of the organizers of the Electric Club and the Electric Trade Society, serving on the executive committee of the latter and being its president for one term. He was on the house committee of the Electric Club and exhibited at one of the meetings of the club the first perfected phonograph made by Mr. Edison. Mr. Reed is a member of the American Institute of the Electrical Engineers.

Henry D. Reed, son of Henry A. Reed, has been connected with the Bishop Gutta Percha Company since 1892, succeeding his father in charge of the technical work of the company and, with his brother, W. Boardman Reed, has managed the business for the past ten years.

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### Death of J. O. Stevens.

J. O. Stevens, secretary of the Postal Telegraph-Cable Company and assistant secretary of the Commercial Cable Company, New York, died February 14.

Mr. Stevens was born in New York, June 19, 1840. At twenty-five years of age he was admitted to the bar as a lawyer and for several years practiced this profession. Shortly after the Postal Telegraph-Cable Company was organized, Mr. Stevens became connected with the company, and during the past thirty-six years continued to serve these interests in an official capacity.

The funeral, which was held at Plainfield, N. J., February 16, was attended by the following business associates and friends of Mr. Stevens: Edward Reynolds, Charles P. Bruch, Charles Shirley, Isaac Smith, William B. Dunn, Henry Zweifel, Thomas G. Barker, William J. Deegan, George Kemp, Henry G. Brinkmeyer, Harry J. McNamee and H. W. Titus.

### Death of William T. Sheridan.

William T. Sheridan aged 47 years well known in telegraph and newspaper circles and official and confidential telegraph operator for the Red Sox on their training trips for many years, died at his home, at Somerville, Mass., on Feb. 19. He had been ill for several weeks.

For several years Mr. Sheridan was manager for the night office of the Western Union at the *Journal,* and later manager at the *Advertiser.*

He was one of the operators at the Russian-Japanese conference and also one of the operators at Marion when President Cleveland had the White House on Cape Cod. For years he was one of the telegraphers who sent the dispatches on the Harvard-Yale boat races at New London.

### Telegraph and Telephone Life Insurance Association.

Assessment Nos. 652-653 have been levied by the Telegraph and Telephone Life Insurance Association, to meet the claims arising from the deaths of E. C. Athearn, Orange, N. J.; A. B Allison, Toronto, Ont.; Robert W. Martin, St. Paul, Minn.; George H. McEathron, Brooklyn, N. Y.; William Huddleston, Stevenson, Ala.; Wm. H. Vandergrift, Manitowoc, Wis.; H. B. Meyer, Macon, Ga.; Joseph L. Laney, Ybor City, Fla.; W. R. Nelson, Los Angeles, Cal.; Reuben Fagan, Jersey City, N. J.; Ralph A. Black, Philadelphia, and Joseph Uhrig, Chicago.

The annual meeting of the Association will take place on March 12, at 4 p. m., 22d Floor, 195 Broadway, New York. A large attendance is desired, as there will be considerable business of importance to transact.

FRANK L. MALONE, a telegrapher well known throughout the New England states, died at Manchester, N. H., February 12. During the past fifteen years Mr. Malone has been employed by the Associated Press and by the Western Union Telegraph Company at Fall River, Mass., Manchester, N. H., and Biddeford, Me.

### Electricity and Magnetism.

A First Book of Electricity and Magnetism, by W. P. Maycock, is a work which constitutes a thorough course in elementary electrical engineering. The book is pocket size and contains 350 pages, covering in an instructive manner all of the principles concerned in the design and operation of electrical instruments. One especially valuable feature of the book is a section on electrical experiments which enables the student to develop and prove the theories discussed throughout the text of the work.

The price of the book is $1.25, and copies may be purchased from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

### First Principles of Electricity.

The above is the title of a new book by J. E. Homans, which contains 248 pages of up to date matter relating to elementary electricity and magnetism. In addition to revised matter covering elementary principles the book includes detailed descriptions of electric wiring, alternating currents, polyphase wiring, motors and generators, armature and field windings, synchronous motors, rotary converters, transformers, etc.

Students who have only an elementary knowledge of arithmetic will have no difficulty masterng the subjects covered in this useful work.

The price is $1.25 per copy, and it may be obtained from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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H. W. DEALY, Secretary.
195 Broadway, New York

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# Telegraph and Telephone Age

No. 6 NEW YORK, MARCH 16, 1919. Thirty-seventh Year

## Telegraph and Telephone Age

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BACK NUMBERS of this journal three or more months old will be charged for at the rate of 25 cents per copy.

NEW YORK, MARCH 16, 1919.

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### Think for Yourself.

The perfect state could well be defined as a high order of civilization, the composite or collective result of individual excellence. Conditions of living based upon abject renunciation of individual desire to excel would constitute a form of intellectual slavery which in time would still the machinery of human progress. A condition wherein a preponderating number of those who do the world's work were self-sustaining intellectually would be a condition properly at variance with ideas of paternalism.

Those in the telegraph business who have worked upward from the ranks of the messenger boy have had unlimited opportunity to acquire at first hand information upon which workable ideas and beliefs may be founded. At maturity, as we take stock of our intellectual equipment, we realize that our beliefs are based upon ideas gained from associates along the road; from observations made on our own account individually, or from both of these sources; and, to a very large extent our worth as units in a progressive society may be measured by the extent to which we apply our own reasoning powers in forming our opinions. If all men reasoned constructively and with the good of their fellows in view, neither the exploiter nor the propogandist would find anywhere an encouraging market for his wares.

Agencies of education are on all hands available, in forms to suit any pocket. Wide and diversified reading is the grist that should be brought to the mill—the mind. The product in the way of ideas should be the meat and the kernels divested of the chaff.

The destinies of the individual and of the nation are inseparable, and as individuals we can best serve the nation by individually learning how to reason intelligently and constructively.

Dr. Frank Crane, the widely read editorial writer, penned true words when he wrote:

"Art, letters, music, craftsmanship, friendship—whatever removes our satisfactions over from the flesh to the spirit—are life-makers, dynamic, fruitful in hope, energic, productive of the permanent joys, and joy means love of life. And don't forget that these things come from within you, don't look for them from the outside."

### Our Educational Department.

This journal serves a very large number of widely separated groups of students and it is a positive sign of the times that a class in British Columbia, or Alberta, Canada, calls for instruction in the same subjects being studied by classes located in Florida or Texas.

The large number of questions continually sent in to us calling for answers, and inquiries asking that certain passages in text-books be explained, have been taken care of by mail. This service has grown to such proportions that we have decided to open a "Questions and Answers Department" in our educational columns, there to publish the answers to technical questions received. Where it is desired or where it will serve the interests of the subscriber, replies will be forwarded by mail immediately upon receipt of an inquiry, and only such answers shall be published as contain information of general interest. In forwarding queries the student may request that his name be not published, but in such cases he should give us initials, such as may be used to identify his answer when published.

We predict that this department will become of great value to telegraph, telephone and radio students, and it is hoped that all those who aim to understand electrical apparatus and electrical circuits will take advantage of this opportunity to procure information.

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# CURRENT EVENTS

## Executive Office Announcements, Personal Mention, Appointments

### PERSONAL.

THOMAS AHEARN of Ottawa, Ontario, a well known old-time telegrapher, president of the Ottawa Electric Street Railway Company, and other electrical enterprises, was a New York visitor on February 27, attending a directors' meeting of the Westinghouse Electric and Manufacturing Company. Mr. Ahearn will spend the remainder of the winter in Southern California.

MAJOR I. D. HOUGH, of the Signal Corps, attached to the general staff at Washington, was a New York visitor on March 3.

SAMUEL W. BEACH, Chief Electrician Radio, U. S. N. R. F., has returned from France, where he has been in active service since early in the war. When the war started Mr. Beach was a member of the telegraph staff in the navy department telegraph office in Washington. Prior to that he had many years' experience in the telegraph, cable and radio services in the Philippines and elsewhere.

SERGEANT A. W. MEYER, of the training section, personnel division, Signal Corps, is the author of the interesting article which appeared in our March 1 issue, entitled: "With the Morse Operators in France." Operators who have recently returned from France state that Sergeant Meyer's report gives an excellent account of the scope of the work accomplished abroad by American telegraphers.

GEORGE M. DODGE of Valparaiso, Ind., accompanied by Mrs. Dodge and their son, Howard, the latter recently released from navy duty, spent the last week of February in Washington and New York.

CHARLES H. H. COTTRELL, the subject of a sketch which appeared in our March 1 issue, is vice-president of the Western Union Employees' Association of the Gulf Division.

EDWARD MURPHY of Iowa City, in government service at Fort Snelling, Minn., since September, 1918, was, on February 19, married to Miss Regina A. Holland, cashier of the Western Union office at Iowa City.

ROBERT I. FLOWERS, stationed at Camp Pike, Ark., during the past year, has been released from army service and has taken a position with the United Press at Clinton, Iowa.

### POSTAL TELEGRAPH-CABLE COMPANY.

ALL REGULAR EMPLOYEES, except messengers and $200 per month employees, who on December 31, 1918, had been in service of the company continuously six months or more, have been granted a ten per cent. increase in wages, effective as of January 1, 1919. This ten per cent. increase is to be reckoned on the ratings in effect December 31, 1918, but is not to be applied to bonus earnings and shall not apply to those whose regular occupations are with other concerns and who are termed "extra" employees by this company. This increase shall not advance any individual salary to more than $200 per month. All overtime work in all departments, beginning March 10, 1919, will be paid for on the former seven hour basis. In the case of linemen employed in gangs, the increase of ten per cent. is to be based upon the actual wage paid in cash.

A. B. RICHARDS, general superintendent, San Francisco, is in New York on a business trip.

HAROLD WYMAN is acting as assistant to John F. Cleverdon, chief electrical inspector.

MANAGERS APPOINTED: G. W. Grimes, Pittsburg, Pa. (stock exchange office); J. L. Flood, Vicksburg, Miss.; L. I. Bennen, Beaumont, Tex.; J. E. Munn, Roanoke, Va.; O. M. McConnell, Anniston, Ala.; J. S. McIntire, Elmira, N. Y., and C. W. Tatge, Palmer House office, Chicago.

VINCENT FIORI has been appointed force chief of the New York main operating room.

BEN CONLIN, expert Morse operator and for many years in the service of this company in New York, and who, during the war, has been in the aviation service, was a main office visitor recently.

THE COMPANY has opened a branch telegraph office in the headquarters offices of the International Committee of the Young Men's Christian Association, 347 Madison Avenue, New York. Miss Anna Menella, formerly operator in the main office, has been placed in charge.

THE COMPANY'S OFFICE at Sandusky, Ohio, is being moved from the West House building to new quarters in the Hubbard building. The move was necessitated on account of the West House building being razed to make way for a new structure.

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## WESTERN UNION TELEGRAPH CO.

NEWCOMB CARLTON, president of the company, returned from Europe on the *Mauretania,* arriving in New York, March 6.

M. B. WYRICK, division plant superintendent, Chicago, was a recent executive office visitor.

W. J. DURAND, acting district commercial superintendent at Kansas City, Mo., has been advanced to the commercial superintendency with headquarters at the same point.

F. C. COLE has been appointed district commercial superintendent at Seattle, Wash., vice I. N. Miller, Jr., furloughed.

E. C. VANDERBILT has been appointed district commercial superintendent at Los Angeles, vice Hugh McPhee, resigned.

C. C. MAXSON, of Vice-President Fashbaugh's office, New York, has returned from a two weeks' trip to Florida.

A. L. BAUER of Louisville, Ky., and H. H. Shain of Philadelphia, Pa., are temporarily located in New York, where they are studying the ticker service with the object of applying New York practice in their respective cities.

FRANK L. MORRISON of New London, Conn., has been appointed manager of the office at Pittsfield, Mass.

C. H. LEMLY has been appointed manager of the office at Warren, Ohio.

J. W. COLE, JR., has been appointed manager of the office at Gloversville, N. Y.; Mr. Cole formerly was manager at Oneida, N. Y.

## New York Western Union.

### Wire Club Inspects Largest Hotel.

The members of the Wire Club of New York visited the Hotel Pennsylvania and, through the courtesy of Mr. Wilson, assistant manager of the hotel, they made a complete tour of the establishment on Saturday, February 15.

The hotel is a magnificent institution, and from the delightful vistas of the roof garden down to the 2,000-ampere electric generator in one of the many subcellars, the guide explained the manifold accommodations, comforts and facilities that make the Pennsylvaina the greatest of hotels.

The tastes of the members were illustrated with considerable force by the successive absentees noted at the roll calls after inspection of each department. Thus, several gentlemen of Southern extraction failed to leave the acre-wide kitchen as scheduled, but it was recalled that thosuands of broilers were in all stages of preparation there and a sympathetic consideration of their case left them to their preferences. Similarly in one of the gorgeous tea rooms and again in the bakery, but the greatest defection was noted upon leaving the telephone exchange, where twenty young ladies attended a switchboard that would easily accommodate the telephone demands of many a grown-up city.

The experience was most instructive to the members, thoroughly enjoyed by all and heartily appreciated.

The Wire Club of New York has for its object the promotion and furtherance of sociability, good fellowship and educational welfare of its members.

THE WESTERN UNION EDUCATIONAL SOCIETY will hold its second entertainment and dance of the present season on the eleventh floor, at 24 Walker Street, on the evening of March 17. The social gatherings of the society are proving to be popular, and at each entertainment the rooms are crowded to capacity.

GEORGE M. STAINTON, plant chief in the main office at 24 Walker Street, died March 5. Mr. Stainton had been employed in the New York office a number of years and was well known throughout the country.

GEORGE B. PENNOCK, operator in the office at 24 Walker Street, died March 6.

### Western Union Brooklyn Employees Hold Banquet.

The fifth annual banquet of the employees of the fourth district metropolitan division was held at the Hotel Bossert, Brooklyn, February 26. Three hundred employees attended the gathering, all departments of the service being represented.

Representatives from the executive offices, New York, who were present included: J. F. Nathan, commercial general superintendent; W. S. Fowler, W. A. Sawyer, A. C. Kaufman, J. R. Hyland and Harry Weidler. Practically all of the fourth district offices were represented; M. J. Hayden, district commercial superintendent, and his assistant John P. Donovan, having charge of the ceremonies.

Others present were: Hon. W. C. Burton, postmaster of Brooklyn; Donald McNicol, editor of TELEGRAPH AND TELEPHONE AGE, and Captain W. C. Gladstone, signal officer in charge at Camp Upton.

The instrumental and vocal entertainment consisted of musical selections rendered by employees of the fourth district. The names of the artists follow: A. K. Lebeck, Joseph A. Brunton, William Vaughan, William Young, Harry O'Grady and William Carr; Misses Anna Marie Brunton, Claire Reynolds, Jessie Young, Margaret Campbell, Fay Morris, Caroline Savarese, Mae F. Eagan and Edyth Washburn.

After the banquet and musical entertainment the floor of the grand ball room was cleared for dancing, which continued until after midnight.

### Boston Manager Banqueted.

C. A. Crane, manager of the Boston district, Western Union Telegraph Company, was on February 27 given a banquet at the Quincy House, Boston, by employees of the commercial department.

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Among those who attended the gathering were: T. W. Carroll, general manager of the eastern division, New York; John A. Hill, efficiency expert, New York; C. F. Ames, commercial superintendent, Boston; W. S. Barker, plant superintendent, and J. B. Rex, chief operator, Boston. The dinner was followed by dancing, with vaudeville entertainment during intermission. Hugh J. Coughlin was chairman of the committee of arrangements.

### Chicago Western Union.

H. W. DRAKE, engineer of equipment, New York, was in Chicago a few days recently.

J. W. KONIGSMARK, division wire chief, is back at his desk after an eleven weeks' sojourn in a hospital.

E. C. DODGE, one of our most proficient quad experts, is ill with influenza. He is at his home at Glen Ellyn, and his condition is reported as serious.

A PETITION has been started by the testing and regulating staff, asking that the national body of the Association of Western Union Employees grant the local technical force a charter.

THE UNITED STATES GOVERNMENT places a high value upon the ability and usefulness of the testing and regulating men from the Chicago office who entered the national service during the war, for of the ten who enlisted only one has so far been released to resume his peace-time occupation. Wally Schulz is the first to come back to us with an account of how well our men measured up to all expectations.

DR. LYMAN L. WESTCOTT, at one time an operator in the Chicago main office, died on February 11 and was buried at Sterling, Ill.

### New York Telegraphers' Aid Society.

By a resolution offered at the meeting of the executive board of the New York Telegraphers' Aid Society, at its meeting held on February 26, and passed unanimously, it was agreed that all former members of the association who answered the call of their country and who, by the nonpayment of dues while in the service were dropped from the roll of membership will, by the making out of an application, be restored to full membership and benefits as of date of application.

Ralph Carr, the society's representative in the main operating room of the Postal Telegraph-Cable Company, 253 Broadway, New York, who is a Big Brother to a host of young telegraphers, is taking an active interest in rounding up the patriotic boys who are eligible for reinstatement.

The society's action in this matter will undoubtedly result in a material increase in membership; new members as well as the returning soldiers.

### Philadelphia Postal Notes.

WILLIAM V. SULLIVAN, for several years connected with the Atlantic City, N. J., office of this company, has been transferred to the main office, Philadelphia. He is succeeded at Atlantic City by John C. McCollum.

THE AUTOMATIC PRINTER CIRCUITS at Philadelphia are to be discontinued April 1, premium Morse circuits being re-established to take care of the traffic.

MARGARET MCCARTHY, telephone supervisor in this office was, on February 27, married to Martin Lewis.

AMONG THE TELEGRAPHERS returning from military to civil life who have entered the service in Philadelphia are Ralph B. Parke, Harry Norton, George F. Wright, Harry S. Payne, William Brown, W. R. Betchel and Harry Lewis.

THE JUNIOR TELEGRAPHERS' organization, on March 3 entertained 200 officials and members of the Philadelphia staff and their families at a musicale and dance. A number of excellent vocal selections and readings comprised the entertainment. A special feature of the program was a fancy costume dance led by Miss Mae O'Connell.

### Dot and Dash Club Annual Meeting.

The Dot and Dash Club, of Philadelphia, an organization of telegraphers, held its annual meeting in Mayer's Drawing Rooms, the evening of March 3. The officers elected for the ensuing year are: C. E. Bagley, president; A. S. Weir, J. S. Calvert, J. M. Jones and F. W. Curtin, vice-presidents; R. C. Murray, secretary; J. H. Wilson, treasurer. The Board of Governors consists of E. C. Boileau, J. A. Chapman, F. E. Maize, John Wintrup, A. G. Wallace, J. W. Collins, T. B. Kingsbury, Earl W. Miller, A. H. Spracklan, H. M. Brown and A. G. Strickland, all of Philadelphia.

During the entertainment that followed the election two of the old-timers present settled a score of long standing. It appears that Frank W. Griffin in the year 1876 worked two hours relieving I. D. Maize (better and affectionately known as "Johnny"), the bargain being that Mr. Maize was to "work it back" for Frank when called upon to do so. Later developents in the lives of the two telegraphers spoiled opportunities of paying the debt; Mr. Griffin, for instance, became superintendent for the American Telephone and Telegraph Company, and necessity of obtaining two hours' respite on his part generally was taken care of in a way that left nothing for his old friend Maize to do.

However, at the Dot and Dash Club gathering, and after a lapse of forty-three years, the slate has been wiped clean. In the presence of the members and guests Mr. Maize paid to Mr. Griffin the sum of eighty-four cents in cash, the same being the compensation current in the year 1876 for two hours' labor at the key.

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## THE CABLE.

THE BRITISH ADMINISTRATION announces that, owing to the interruption of several wires in the cables to Holland, an auxiliary wireless service has been provided pending completion of repairs.

MESSAGES INTENDED FOR TRANSMISSION by wireless should be marked by senders "via wireless," and these words should be included in the service instructions. Rate same as by cable.

PERSONAL CABLEGRAMS may be sent to members of the allied forces in the area of allied military occupation. Business messages not permitted.

ON AND AFTER MARCH 15 telegraph offices at Beyrouth and Tripoli, Syria, will be open and will take business or social cablegrams in plain language, English or French. Conditions, sender's risk.

LEGAL TIME was advanced sixty minutes from March 1 to October 5 in France and Algeria, and in Italy from March 2 to an undetermined date. In Belgium legal time is advanced sixty minutes from March 2 to an undetermnied date, and in Portugal it is advanced sixty minutes from March 1 to October 31.

### Pacific Cable Traffic.

During the year ended March 31, 1918, the submarine lines of the Pacific Cable Board handled over seven and one-half millions of paying words of international traffic, in addition to nearly six hundred thousand words of free matter relating to wounded members of the colonial expeditionary forces. Between Australia, New Zealand and the Pacific islands nearly two million paying words were handled during this period over these cables.

### Central and South American Telegraph Company Stock Increase.

At the special meeting of the Central and South American Telegraph Company, held in New York February 11, it was voted to increase the capital stock of the company from $14,000,000 to $25,000,000. As outlined in a circular addressed to the shareholders, under date of January 3, it is proposed to use the new stock to provide for extensions, and the acquisition of other property and for distribution to stockholders of accumulated earnings.

## RADIO TELEGRAPHY.

### MARCONI NOTES.

EDWARD J. NALLY, vice-president and general manager, arrived home from Europe on the *Nieuw Amsterdam*, March 9.

WILLIAM H. HOWARD is en route to Manila, P. I., on business of the company.

COMMANDER RICHMOND, R. N. V. R., of the English Marconi Company, passed through New York recently en route to Pekin, China, sailing from San Francisco, March 15, on the steamship *China*, to supervise the erection of Marconi stations in China.

## CANADIAN NOTES.

CHARLES R. HOSMER, director of the Canadian Pacific Railway Company's Telegraph, was on February 20 reported to be making satisfactory progress at the Royal Victoria Hospital, Montreal, where he underwent an operation.

JAMES J. HORN has been appointed superintendent of the Canadian Pacific Railway at Kenora, Ontario. Mr. Horn began his career as telegraph operator at Pembroke, Ontario, in 1890, and has been employed as operator, dispatcher and chief train dispatcher on lines between Fort William and Winnipeg since 1893.

THE CANADIAN PACIFIC RAILWAY COMPANY'S HONOR ROLL, No. 40, shows the names of the following telegraphers: Albert Rutherford, Toronto, killed in action; John W. Bell and George E. Eames, wounded in action, and Frank Servey, lineman, wounded in action.

THE CANADIAN PACIFIC RAILWAY COMPANY'S TELEGRAPHS will complete during March the stringing of an additional copper telegraph wire between Halifax and Montreal.

A BILL providing for the taxation of certain companies, which has passed the Saskatchewan legislature, includes every telegraph company and every railway or other company which owns, leases or operates telegraph lines, and carries on a general commercial telegraph business in the province. The tax is fixed at one per cent. of the gross earnings for the preceding year in case such percentage does not exceed $2,000, but, if on such a basis the tax collectible should exceed $2,000, the maximum tax shall be $2,000. Companies are required to make a return to the Provincial Treasurer, for the purpose of levying the tax.

W. D. SLOCOMBE, agent at Nanaimo, B. C., for the Canadian Government Telegraphs, represents TELEGRAPH AND TELEPHONE AGE in that part of Canada and looks after the sales of Vibroplex sending machines.

### Convention of Grand Trunk Pacific Telegraph Officials.

The third annual conference of the Grand Trunk Pacific Telegraph Company's officials was held at the Macdonald Hotel, Edmonton, Alberta, on February 17 and 18, presided over by H. Hulatt, manager of telegraphs, Grand Trunk and Grank Trunk Pacific Railways, Montreal. Important matters tending to increase the efficiency of the service were discussed. Among those present were: Superintendents W. J. Rooney, Western Division; W. E. Bell, Central Division; Electrical Engineers S. Robertson, E. H. Hiscock; General Foremen G. Nicolson, D. S. Adamson, G. Spratt, A. Dougall; Chief Operators J. A. C. Kelman, C. A. Radford, J. Stevens; City Managers J. E. Grace, Winnipeg; G. A. Jackson, Regina; A. Vogel, Saskatoon; G. B. Brien, Calgary; J. O. Pilon, Edmonton; J. E. Lalonde, Prince George.

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Mr. Hulatt entertained all those attending the conference at dinner, Monday evening. Superintendent N. B. Walton, Division Freight Agent L. V. Druce, City Passenger and Ticket Agent J. F. Philp, Messrs. J. C. C. Bremner and A. W. Wylie also being present at the latter function.

### Canadian Government Telegraphs.

JAMES MCNEIL, agent at Victoria, B. C., and F. C. Munn, agent at Vancouver, B. C., have changed positions.

MR. GILLESPIE of the Parksville office is absent on vacation. He is relieved by Lou Bradley, recently returned from military service in Africa.

JOCK AITKEN, agent at Courtenay, is temporarily located at the Campbell River office.

FRED BROWN, at one time chief dispatcher for the Esquimalt and Nanaimo Railway at Victoria, is now acting as agent for the Government Telegraphs at Union Bay, B. C. Mr. Brown is one of the most widely known railroad telegraphers in Western Canada.

J. M. MACLEAN has been appointed agent for the Canadian Pacific Railway Company's telegraphs at Nanaimo, B. C. Mr. MacLean previously has been located at Fernie, B. C.

### Amateur Wireless in Canada.

The restrictions regarding amateur wireless stations are still in effect. The naval service department advises that no licenses are being issued for this class of stations as yet. It is probable, however, that this regulation will be modified in the near future. In the meantime, any persons desirous of then operating an amateur station should file their application for license with the naval service department. Application forms can be had on application to the deputy minister of the naval service, Ottawa. Licenses can only be issued to British subjects.

### Canadian Pacific Railway Company's Telegraph Moves Into New Main Office in Winnipeg.

The Canadian Pacific Railway's main commercial telegraph office at Winnipeg will, in the course of the next few weeks, move into new quarters on Main Street, near Portage Avenue, and about 100 feet north of the present location. It was expected some years ago that the next move would be into a permanent home, as the company previous to the outbreak of war intended erecting a modern office building on the corner of Portage Avenue and Main Street which would house the telegraph department as well as other departments of its service. The war, however, changed or deferred many plans. The building which is now to be occupied by the telegraph department, is the company's property and is known as the Porter Block. It was occupied by Richardson and Bishop until a few months ago, when it was completely gutted by fire. The old shell will be retained and the interior renewed, and what was a five-story building will be converted into four stories. The building is L-shaped, its inside dimensions being 118 feet deep, 28½ feet wide facing Main Street and for 88 feet of its depth, and 44 feet wide for 30 feet facing the lane. This irregular shape has been found to be of great advantage, especially in the operating room. The basement will be floored and finished and be used for filing and store rooms. The ground floor, where the service is brought into contact with the public, will be tiled; the counter over which messages will be received will be of oak and the public space will be furnished with oak tables and desks, for the convenience of customers. The local agent's office will be of easy access to the public. The cashier's cage will occupy part of the thirty feet of counter space. In all about 1,200 feet of floor space will be devoted to the public, the receiving department and the local agent's office. The delivery department will be on the north side of the room and will consist of a long hall 10 feet wide by 55 feet in length for the accommodation of the messenger force. The wall separating the clerical and messenger forces will be pierced by four wickets. There will be a back doorway to the lane and a front doorway for contact with the clerical force. The delivery will be close to the receiving department. The telephone department will be so located as to to be in close proximity to both receiving and delivery departments. The balance of the ground floor space will be occupied by the accounting department.

The operating department will occupy the first floor. This room has a lofty ceiling 24 feet high with two rows of windows both back and front, with a skylight, and will therefore be well lighted and ventilated. Its equipment will consist of Morkrum printers for the accommodation of which seven tables are provided. The Morse department will have four quad sets, thirty duplex sets, twenty-four single sets and three tables for the concentration cabinet. Repeater tables will contain four sets of direct-point repeaters, two sets of Weiny Phillips and two sets of Jester-Cooper repeaters. The switch boards and loop board will be at the rear of the room on the south side and will relieve the inequality in the appearance of the room where it is widest. The main switchboard consits of three slate panels of fifty wires each, mounted on steel frames. The loop board, also mounted on a steel frame, will have accommodation for 200 loops. At the foot of the main switchboard, and at an angle to it, will be placed a transfer board consisting of 150 pin-jacks. The wiring between the switchboard and the tables will be by means of cables of 16 gage conductors encased in iron piping. All jumper wires are of enamelled flame proof wire 18 gage. The space behind the switchboard will be about 15 by 30 feet and will contain the power machines, distributing and transfer racks and power boards. The main lines will be conducted from a man-hole in

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the lane to the distributing racks where they will be fused and passed over to the transfer racks. The wiring of the distributing rack and the main switchboard remains permanent; any changes necessary to adjust irregularities of position will be made at the transfer rack. The power will be supplied by ten main line and two local machines. Four main line machines will have a voltage of 400, two using D. C. and two A. C. driving power. Four machines of 200 volts are similarly constructed and two machines will have a voltage of 110, one each for D. C. and A. C. power. The two local machines of 30 volts driven by D. C. power will supply all the power needed for local purposes. There are several sources of power available which will be harnessed and made ready for immediate use, the Winnipeg Street Railway, the City of Winnipeg Light and Power and the company's station plant; the latter will be more of an emergency source. All three sources of power furnish both direct and alternating current. The main power board will be mounted on marine finished marble. The Morkrum power and switchboard, which will be placed in the Morkrum department, will be but extensions of the main boards and will be mounted on Canadian marble. The tables will run with the length of the room in two rows which will leave one main aisle the entire length of the room with ample space between tables and either side wall, two tables end to end and then a break for passageway. This arrangement allows the light from back and front an unobstructed diffusion.

The second floor does not run the entire length of the building. It is about 70 feet in depth in order to permit of skylight for the operating room. This floor is fitted up with lockers, lavatories and rest rooms, and is divided into two distinct parts; the front of the building being assigned to the ladies and the back part to the gentlemen.

The third story is of the same dimensions as the second and will constitute the private and general offices of the assistant manager of western lines and the district superintendent. All the offices will be connected by a pneumatic tube system, and a stairway as well as an elevator will connect the different floors.

The new office will be convenient in every way and a great improvement in this respect to present quarters. Inspectors Scott and McMillan are in charge of the work of installation of electrical equipment under the supervision of Superintendent E. M. Payne.

## Telegraph Strike in Sweden.

Telegraph and telephone service throughout the south of Sweden is threatened with interruption owing to labor unrest. The workers plan to strike unless their demands are met.

The old wire chief says: "Above all things, early in life get over being bashful; but, make sure that you never fail to be modest. Now, get out your dictionary."

## Progress of Government Control of Telegraphs.

Return of the telephone and telegraph properties to private management by June 30 was recommended to President Wilson by Charles E. Elmquist, president of the National Association of Railway and Utilities Commissioners, in a letter made public, February 23. The recommendation was made, Mr. Elmquist explained, on behalf of the executive and war committees of the association, which includes commisioners of practically all states.

"The net result of six months of operation by the Postmaster General of these wire systems," says the letter, "is inferior service and substantial increases in charges to the public."

"No military necessity can now be pleaded in support of government control," the letter continued. "The quality of the service has in many cases deteriorated. No rule, regulation, practice or rate has been adopted for military purposes.

"Rates and charges have been greatly increased without giving the patrons or the public an opportunity to be heard as to the reasonableness or justice thereof, although the principle was long ago settled that important changes shall be submitted for public consideration before becoming effective.

"These rate changes are applicable upon state as well as interstate traffic, and have thereby caused widespread dissatisfaction with Federal operation.

"Fundamental changes are being made in the operation of these systems which probably could not be legally done under private control, and which upon return to private management may cause serious disturbance in the relative status of the different wire systems. Federal operation has also disrupted service and resulted in interfering with many of the established practices in forty-four states of the Union. It is felt that prompt return to private operation will result in securing improved service, the restoration of reasonable rates and charges and the giving of adequate protection to both the public and the corporations.

"The Postmaster General's recent declaration that employees engaged in the public service should receive higher compensation than those engaged in private service of a similar kind, which as a matter of fact can be accomplished only through rate increases, has caused a demand by the employees of the wire systems for largely increased wages, and has resulted in a decrease in morale and efficiency until such demand is complied with.

"Unsatisfactory operation is resulting in a broadcast public feeling that the wire systems should be returned immediately to private operation. In fact, there are now no advocates of government control except the companies who now receive or expect to receive benefit therefrom, and those who favor government ownership of the wire systems."

Following the publication of this recommendation the Postal Telegraph-Cable Company announced their willingness to compete with the government controlled lines if the government would return the properties of the Postal Telegraph-Cable Company to their owners.

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Such an experiment, officials of the company pointed out, should remove this much discussed question altogether from the realm of the conjectural and the theoretic. Deterioration of the service under government management is, they emphasized, universally conceded. The government has pleaded in extenuation abnormal and extreme conditions. Here, they said, is a chance for the two methods of operation to be tried out side by side, contending against the same obstacles, the same problems. The result should be to demonstrate which is really the most efficient, the most economical.

"If the Administration is not afraid of that test," it was said, "there is no reason why it should not accept our offer and leave the decision to the public."

The Mackay companies, it was added, are ready to enter upon such a contest immediately.

OPERATING BOARD ISSUES INSTRUCTIONS.

U. N. Bethell, chairman of the operating board of the telegraph and telephone administration, has issued the following order:

"Pending preparation by the operating companies, and approval by the Postmaster General, of a general programme for construction work to be done during 1919, the operating board directs that the companies proceed in the usual and ordinary course of the business, with their routine construction and maintenance work, and with such specific essential construction projects as the companies approve and are prepared to finance, provided that in competitive situations all projected construction other than that of a routine character shall be submitted through the regular channels for the approval of the Postmaster General."

One effect of this order was to call forth a protest from the management of the Postal Telegraph-Cable Company. An official of the company said:

"In the South and Southwest and on the Pacific coast we are giving an extensive long-distance telephone service in competition with the Bell Telephone Company, and our rates are considerably lower.

"This order of Mr. Bethell, by authority of the Postmaster General, means that if we wish to extend that long-distance telephone service in competition with the Bell Telephone Company we must apply to the operating board. And what chance do you suppose we would have with that board sitting in judgment on extensions which we propose to make in competition with the Bell Telephone, especially when we charge lower rates?

"This is not only putting our business in the hands of our competitors with a vengeance, but is the boldest attempt that has yet been made to crush all telephone-telegraph competition in this country, and we think it will appeal to every business man who competes for business as an outrage."

CABLE SEIZURE CASE BEFORE SUPREME COURT.

Charles E. Hughes, appearing before the Supreme Court March 7, as counsel for the Commercial Cable and Commercial Pacific Cable companies, charged that Postmaster General Burleson by taking control of the marine cable systems five days after the signing of the armistice had misused the powers conferred by a joint Congressional resolution, had given the resolution an interpretation "foreign to the intent of congress," and had as an "ulterior motive" the forcing of government ownership of the cables.

The accusations of Mr. Hughes were generally denied by Solicitor General King, who presented the case of the government, asking that the court sustain the decrees of lower courts dismissing injunction proceedings brought by the two cable companies to prevent the Postmaster General from taking over their cables and merging them with those of the Western Union Telegraph Company.

WIRE BILL SIDETRACKED.

One of the many bills that failed of passage by the late congress was that limiting the period of government control of telegraphs and telephones to December 31, 1919. The understanding is, however, that the President may at any time order the return of the properties to their owners.

## Corporal Thomas A. Nolan, Late of the New Haven Railroad.

Among the citations issued by Major General Robert Alexander, of the Seventy-Seventh Division, appears one referring to Corporal Thomas A. Nolan of Company B, 302d Field Signal Battalion.

Corporal Nolan, before entering the military service in July, 1917, was employed as telegrapher on the New York, New Haven and Hartford Railroad at Rye, N. Y.

The citation reads:

"Corporal Thomas A. Nolan, Company B, 302d Field Signal Battalion.—On the night of September 7, 1918, between six and seven p. m., the telephone line between 154th infantry brigade headquarters at Blanzy-les-Fismes and 307th infantry advance headquarters at Le Grotte was broken in sixteen different places by shell fire. Communication was resumed at seven p. m. At 7:30 p. m. the line was again destroyed by hostile shell fire. On account of many breaks and heavy rain the wire was necessarily abandoned, and the emergency demanded that a new line be laid immediately from brigade headquarters to regimental advance post on account of an attack that was to be made. At 7:45 p. m. a party of men, of whom Corporal Nolan was one, began to lay a new line by hand a distance of two miles. At eight p. m. a barrage was laid by our artillery, which was followed by a heavy hostile counter barrage through which the line was being laid. These men continued their work without hunting shelter, in utter disregard of their personal safety, and completed the line at 9:30 p. m. All the men of the signal detachment had been on duty for eighty hours previous to the abandonment of the line, and when informed that a new line was required these men, without hesitation, volunteered their services."

W. E. NEWCOMBE, manager, Western Union Telegraph Company, Ashland, Ore., writes: "You did right in continuing my name on your list, as your publication is invaluable."

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# A Radio Remote Control Used in France

By SAMUEL W. BEACH.

There is little doubt that if a French overseas force were to come to America to help us win a war waging within our own boundaries, we would insist upon some sort of voice in the conduct of that force. We would, of course, not hamper the installation and operation by them of systems of communication, or even of types of war machinery which they liked best and which they the better understood, but, just the same, we would feel highly peeved were they to build up there, tear down here, or operate over yonder indiscriminately without so much as asking permission.

We encountered just such a condition in France while we were establishing our forces over there. There was not much that we did or could have done without special permission from the French authorities, and generally they stipulated that they should enjoy a definite measure of supervision therein.

While the French were entirely within their rights in this, in practice there were occasions when American good nature was put to the test.

At several French radio stations along the coast, for instance, our ally allowed us to keep a wireless watch, side by side with their operators. But the apparatus was entirely under French supervision, and it was stipulated in most cases that we could not touch the receiving sets with the idea of improving incoming signals. The French operator on duty attended to that.

Petty squabbles between the French and American telegraphers crept in at times, just as they do within the sacred precincts of the most exclusive F. F. V's. Sometimes, because of this childish animosity, instances occurred wherein, while the American was struggling to hear a difficult code message from some distant ship, his fellow patriot reached up and turned a knob, seemingly to either "tune out" the incoming signals altogether, or render them still harder to hear, suavely pretending either that he had no idea that the Yank was copying, or that he himself was adjusting for some other ship or station. Nor were the French invariably at fault, ill feeling often being directly blamable on our own men.

The principal Franco-American radio stations along the coast were situated some distance from the closest naval headquarters or "flag office," and were connected thereto by land telegraph and telephone lines which necessitated the employment at both terminals of enough Morse telegraphers to cover the work—a rather huge expense considering that the amount of traffic handled seldom exceeded forty or fifty messages per day, and the time consumed in relaying was a vital factor. Every moment counts heavily when ships at sea in a submarine zone are concerned.

In their first attempt to eliminate some of the disadvantages related, the Americans erected their own radio antennae above or close to their headquarters buildings, but these were for the purpose of receiving only. The results were far from satisfying.

Then came the radio remote, or distant, control, whereby the employment of Morse telegraphers upon those circuits was entirely unnecessary, as relaying of radiograms by hand was eliminated. The headquarters station received all the air dispatches direct, and when one was to be transmitted, the Flag Office operator had but to signal over a buzzer circuit for the man on duty in the distant Franco-American station to start up his generator, and then the flag operator sent the message which was automatically broadcasted through the distant apparatus.

The following description is that of the remote control connecting the United States naval base at Lorient, Morbihan, France, with the big Franco-American station at Pen-Mane', about one and a half miles distant. It is an especially apt illustration, because it brings in an intermediate French station, and because a short submarine cable figures in the make-up. The French, or tower station, was never used, but in order to get permission to build the control at all we had to include it in the wiring, which called for a rather unique switch arrangement.

The system consists of two grounded circuits, one for signaling and the other for the manipulation of the Pen-Mane' radio transmitting set by either the American Flag Office or the French tower in Lorient.

In the heavy lines of the accompanying diagram we have the main control circuit, while light lines indicate the signal, or buzzer circuit.

The double-throw switch at the tower is kept thrown to the right, the control pathway merely entering the tower switch at 1 and passing out at 2. The ordinary Morse telegraph key at the flag office has no circuit-closing device, so that it remains on its back, or open, contact when not in use, and the entire circuit is normally open.

Should the flag operator desire to send a radiogram via the Pen-Mane' plant he first notifies the Pen-Mane' to that effect over the buzzer line hereinafter described, using a special code of signals. Pen-Mane' then starts his transmitting set and broadcasts the high power warning to vessels in the harbor.

Flag closes his key, K1, to make the first dot or dash. This action completes a circuit from the ground, G, through K1, through the tower switch, the submarine cable, the ordinary Morse 150-ohm relay 4, the switch 5, through main battery of fif-

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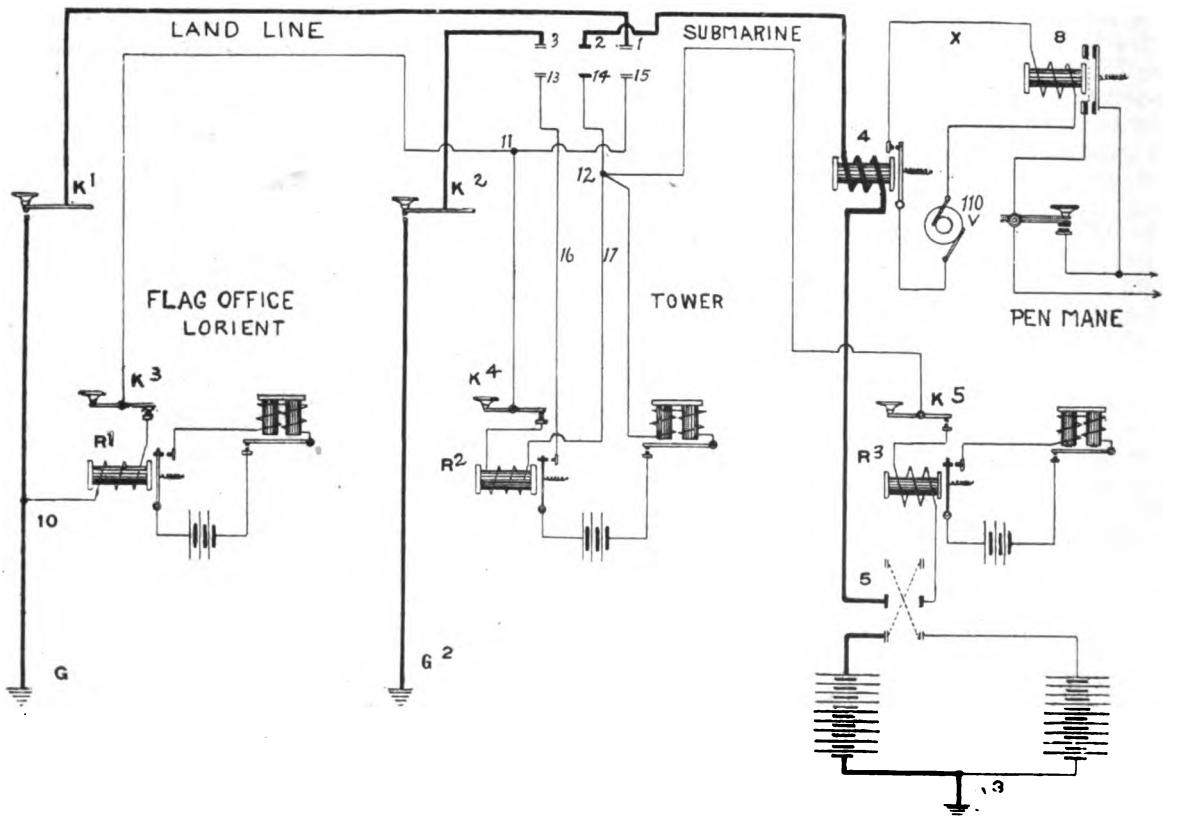
teen bluestone cells from which it derives its power, and hence to the ground, G3.

The magnets of relay 4, at Pen-Mane' are energized by this action, the relay tongue is attracted, closing the local contact, which, in turn, picks up a 110-volt current as illustrated at that station, one of the leads from which passes through the coils of a heavy, stoutly built control relay 8, especially constructed for the purpose.

This big control relay is supplied with two sets of double contacts, as illustrated, about the diameter of a nickel. These contacts come together quickly when the control relay's magnets are energized by the 110-volt current. It is this latter action that completely takes the place of the main radio sending key at Pen-Mane'. The back local contacts of the control relay are merely an extension from one of the main key contacts, while the contacts of the tongue itself are connected to the opposite main key contact. Thus, the action of the closing of the big relay's armature in response to closing the little key back in the flag office at Lorient results in the closing of the main radio transmitting key at Pen-Mane'.

The French operator at the tower may use the control circuit by throwing the double-throw switch to the left. This cuts off the American flag office wire at 1, but throws in the French key, K2, creating a circuit from G2, through K2, the switch at 3 to 2, and thence to Pen-Mane'. At this juncture the flag office cannot use the control, nor can he do so until the tower office finishes transmission and again throws his switch to the right.




While at rest there is a steady current in the signal circuit, its pathway being normally from the ground, G1, through 10, through relay R1, key K3 (which, like K4 and K5, is closed when resting upon its back contact), over to the switch point 15 at the tower. Were the tower switch to the left, the pathway would be open at 15, but would find an outlet by passing connection 11, through K4, R2, connection 12, the cable and onward to Pen-Mane'. Thus it will be seen that the tower switch not only cuts in or out the radio control circuit, but also the buzzer, or signal line. The circuit is supposedly normal, however, the tower office is cut out by its switch being to the right, so the incoming pathway follows the knife of the switch from 15 to 14, to 12, thence via the cable to K5, R3, switch 5, connecting a 15-cell battery, and to the ground at G3.

All keys in the signal circuit are back contact affairs. There is normally a steady current flowing, so that all relays are magnetized, including that at the tower should the switch there be to the left. Should either of the keys be depressed so as to open the circuit, all relay tongues would fall back and close their respective local buzzer circuits, which latter consist each of two or three cells of dry battery in series with an ordinary buzzer. We have here a buzzer telegraph line over which necessary conversation concerning the distant control proper may be carried on.

It will be noticed that while the tower switch when thrown to the left completely cuts off the control circuit from the American flag office, it in no way interferes with the latter's buzzer line.

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With the tower switch to the right, its relay R2 is demagnetized and its tongue closed would continuously ring the buzzer at the tower were it not that, to eliminate this, wires 16 and 17 are brought up to points 13 and 14 in the switch to break the local buzzer circuit. This break is bridged over whenever the switch is thrown to the left.

There are two separate sets of bluestone battery at Pen-Mane', one for the control and one for the buzzer lines. As the signal circuit is normally closed while the control line is generally open, the batteries are equalized in their work by throwing the switch 5, once every day, which action swaps them, so that each battery has a day of almost continuous work, followed by an equal amount of rest.

At Pen-Mane' there is a simple knife switch at X, kept open when the control is at rest. This is to prevent interference by somebody inadvertently closing the flag office or tower control keys while the French in Pen-Mane' are transmitting.

The switch arrangement at the tower and the battery arrangement at Pen-Mane' were gotten up on the spot to fill a peculiar condition. We had a multitude of "peculiar conditions" to meet over there. But we met them to the satisfaction of our French allies as well as to our own supreme command.

## Improved Vacuum Bulbs.

Recently manufactured vacuum bulbs for use in radio signaling differ considerably in appearance from the original instruments of this kind—the Fleming "valve" and the De Forest "audion" first introduced about fourteen years ago.

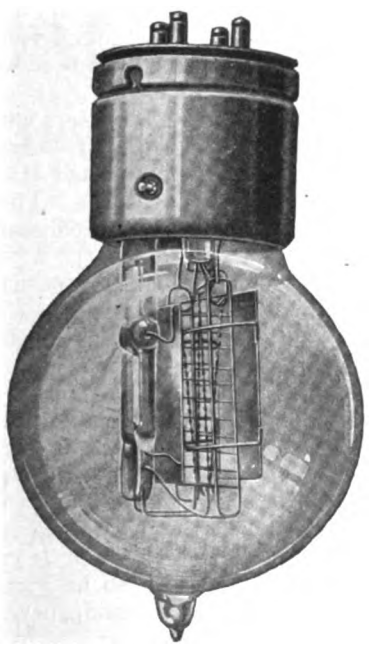

FIGURE 1.

In the March 1 issue of TELEGRAPH AND TELEPHONE AGE was presented an interesting story of the development of the audion, showing illustrations of recently designed De Forest tubes and radio telephone sets.

In the accompanying illustrations Fig. 1 shows the latest type of radio telephone transmitting bulb, and Fig. 2 the latest receiving bulb supplied by the Western Electric Company.

Until quite recently one form of bulb was used for both sending and receiving, but for aeroplane signal service under war conditions it was found by American radio engineers that the requirements

FIGURE 2.

of sending and receiving were sufficiently different to warrant constructing a special type of bulb for each.

Vacuum bulbs are now used for receiving electric wave signals for both radio telegraphy and radio telephony; as amplfiers of electric currents of audio or radio frequency; as generators of radio currents, and as voltage and current regulators for machine generators of electricity. Indeed, it is probable that the possibilities of vacuum tube electrical devices extend far beyond present conceptions.

## Short Cut in Insulation Measurements.

W. A. Woods, toll wire chief for the American Telephone and Telegraph Company at Casper, Wyo., has worked out a comprehensive table showing the insulation resistance in megohms for any deflection of the testing voltmeter from 1 to 150 volts for one mile of wire, using the standard 100,000 ohm voltmeter and 150 volt testing battery.

When a table is available based upon given values of testing battery and voltmeter resistance, showing the insulation resistance for one mile of line, all that is necessary is to note the deflection and then multiply the length of the wire in miles by the scale figure indicating the resistance per mile.

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## Denny Brown.

Adventure and romance seem to be things of retrospect rather than of purpose. Today, should one go out and search for adventure it could nowhere be found; that is, recognized. It is only when we look back over a period of twenty or thirty years and review the experiences which made permanent impressions upon memory that we are able to sort out occurrences and incidents which contained the kick of romance and adventure.

Consider the case of Denny Brown. Should you meet him today in the main office of the Western Union Telegraph Company in Washington, D. C., you might be justified in deciding that he had led a humdrum, prosaic existence, hedged about with number sheets, blues, reds, and cablegrams end on end. And, so far as Denny is interested in your deductions he is satisfied to have you think that these things have been the elements of his existence.

It is only from Mr. Brown's old associates that one may gather the details of experiences of his which in several instances were of a nature closely akin to adventure.

Many years ago on a Saturday morning at 2 o'clock, while Mr. Brown was working in the Western Union main office in New York, he was making a dash through the narrow streets of lower New York to catch a ferry boat, which, should he miss, would have given him an hour on the dock for nocturnal meditation. The sequel proved a paradox, for, had he not been running so fast he would have caught the boat with thirty seconds to spare. The high speed he was making attracted the attention of a policeman, with the result that Denny was captured and taken to the Oak Street station for examination. At the station the lieutenant was skeptical and detailed a man to take Denny to the Western Union office for identification. Someone saw the pair coming and tipped off the operating room officials to deny acquaintance with the culprit. Reaching the operating room Denny wore a happy smile and felt safe once more; but, to his dismay, each chief operator approached simply could not remember ever having seen the man before. Denny offered to sit in on a wire and prove that he was a telegrapher, but the limb of the law had had enough, and took him along. The unlooked-for happened, however. The elevator man recognized Denny and spoke to him in a friendly way, and possibly being of the same political faith as the policeman, persuaded that worthy that he was making a terrible mistake. Denny caught the 3 o'clock boat, but he walked to the ferry house; cautiously—deliberately.

Not long ago Denny was walking across a street in the national capital when someone celebrating the return of fighting men from the front, blew a horn so close to the telegraph man's ear that he made a straightway jump of six feet and collided with a moving horse. For a moment the situation was serious, but Denny got the horse's eye, and thinks he recognized him as one of the ponies that owed him money since the old days at Guttenburg or Havre de Grace, and although the nag could not avoid stepping on him, he did it tenderly and with a due appreciation of past favors.

Denny has twice been knocked down by automobiles; once the outfit got away, but the second speeder took him home in the car and took his receipt for a pound note—no questions asked.

In the old Monmouth Park racing days Denny reported the results from the track; that is, from a vantage point somewhere near the track. Subsequent investigation by an opposition agency revealed the fact that Denny had an option on a favorably situated spruce tree at ten dollars per day as inhabited.

Some of the more exciting adventures experienced by the subject of this sketch were involved in details which could be better described in executive session and with the lights turned low, than in a magazine article.

The experiences of Denny Brown, liked wherever he is known, prove that adventure and romance are things of retrospect.

## A Tidy Stock Keeper.

John F. Cleverdon, chief inspector in the engineering department of the Postal Telegraph-Cable Company, New York, recently had occasion to make tests at a factory on a quantity of new armored cable. The core and insulation tests showed that the manufacturer had adhered strictly to the specifications, but when a test was made of the galvanized iron armor wire used in forming the outside protection of the cable it was found that the galvanized film supposed to cover the iron wire was to a large extent nonexistent. Mr. Cleverdon procured from the manufacturer's stock keeper several samples of the wire, and each sample when immersed in the jar of sulphate showed the same serious defects; namely, that the galvanizing had been very imperfectly done.

When the manufacturer's engineers were apprised of the situation they sent to the stock room for additional samples of the wire and had Mr. Cleverdon perform the test in their presence. The same dismal result followed—the galvanized coating simply was not there.

Someone suggested, hopelessly perhaps, that a visit be made to the stock room to look into conditions there. The stock keeper was an old-timer and had been on the same job for many years. It was not thought likely that he had made a mistake. However, to gain time, and to make a show of concern, one of the engineers asked the stock keeper what he had done to those various samples of galvanized iron wire he had sent to the test room. The s. k. replied that he had done nothing to them; in fact, the samples as he took them from the shelf were not very clean looking, so he had brightened them up a bit with a piece of sandpaper.

Silence followed, but as eyes sought eyes there was an exchange of telepathic eloquence between the inspector and the engineers that for poignant purport could not have been equalled by Lenine or Trotzky at their best, or their worst.

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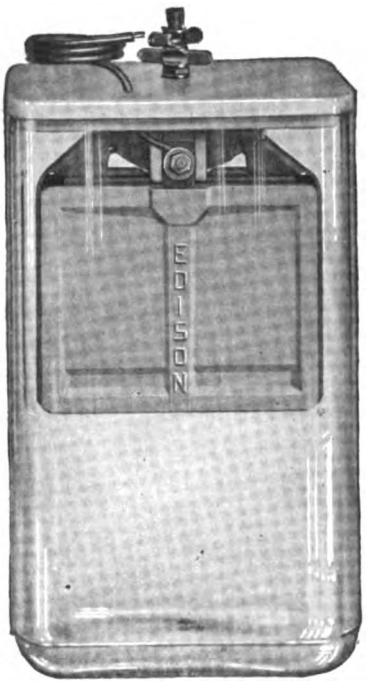
# FOR CLEAR TRANSMISSION

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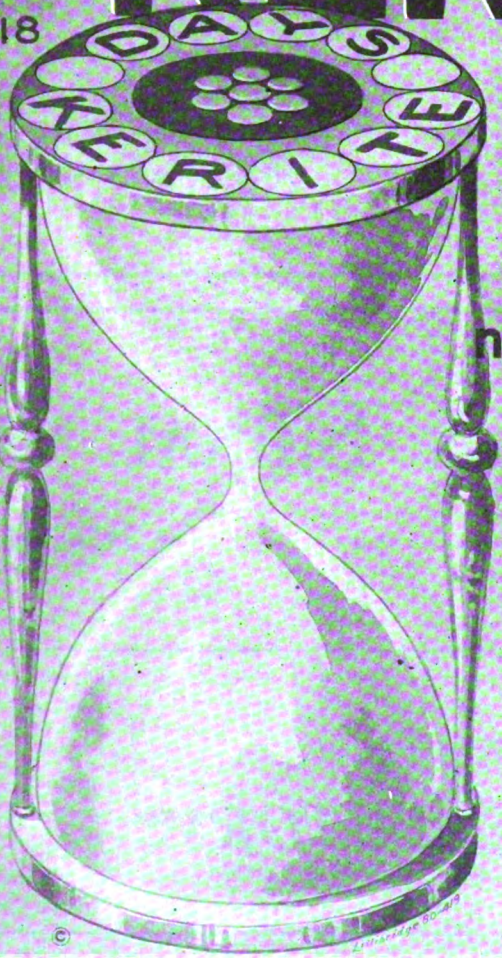
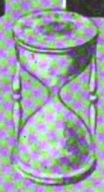
# KERITE

1918



1850

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## THE RAILROAD.

### Proceedings Published of Association of Railway Telegraph Superintendents' Annual Meeting.

The association has published the proceedings of the annual meeting held in Chicago, December 5 and 6, 1918, the volume including the proceedings of the eastern division meeting held in Chicago at the same time.

The Chicago meeting was the thirty-sixth annual gathering of the members of the association and was one of the most important and best attended technical sessions ever held by the telegraph superintendents.

The volume published contains in full the papers presented at Chicago, together with the discussion of each paper. These include:

Report of Special Committee No. 1, Construction and Maintenance, Outside Plant; Specifications for Underground Conduit Construction for Electric Cables; Report of Special Committee No. 2, Construction and Maintenance, Inside Plant; Report of Special Committee No. 3, Wire Chief Equipment and Routine; Report of Special Committee No. 4, Protection Against Electrolysis; Report of Special Committee No. 5, Protection Against Lightning and High Tension Circuits; Report of Special Committee No. 6, Telephone Development; Report of Special Committee No. 7, Railroad Message Traffic; Wireless Telegraph and Telephone Development; The Buzzer as a Telegraph Receiving Instrument.

W. F. WILLIAMS, superintendent of telegraph of the Seaboard Air Line, Norfolk, Va., was a New York visitor on March 10.

THE RAILWAY TELEGRAPH AND TELEPHONE APPLIANCE ASSOCIATION will hold its annual convention in Chicago June 11 and 12. A. D. Walters is chairman, G. A. Graber vice-chairman, and G. A. Nelson secretary-treasurer. The executive committee consists of the chairman and vice-chairman, and Messrs. B. A. Kaiser, E. E. Hudson, W. T. Kyle, A. D. Smith, Val B. Minton and G. K. Heyer.

### A Station Agent's Income.

In denying the petition of the United States Railroad Administration, asking permission to discontinue the railroad depot agency at Solvay, N. Y., the Public Service Commission disclosed the fact that the agent at that hamlet is being paid a total salary of $7,730.00 per year from three positions all under the control of the federal government; namely, ticket agency, express and telegraph. Out of this total the agent pays $2,418.00 for clerical assistance, leaving his net income $5,312.00.

The Public Service Commission suggested that the compensation be reduced to a figure in keeping wih the duties, and ruled that the station should be continued as a convenience to the public.

### The Music of Two-Letter Calls.

A telegraph operator employed on the Duluth and Winnipeg Pacific Railway, and who has for a personal "sine" the clueless combination "DQ," in a communication on another subject includes some observations bearing upon the two-letter calls assigned telegraph offices along the road on which he is employed. He says:

"I have often wondered who originated the telegraph calls on the D. W. P. If a dispatcher is to delight in calling his offices, the signals should be in harmony and rhythm and express some thought of the station called, whenever practicable. With such men at our head as General Manager Cameron, an old-time operator, who loves the art of telegraphy, we will probably continue to use the telegraph for train dispatching for some time yet. Therefore, while we last as telegraph operators, let us have a little of the joy of the calling.

"RI" Ranier, very good; a man can dance to it. "JN" Ranier Scales; don't that remind you of Jean or Juanita? That one has grace and beauty and should be played gently. "BN" Ericsburg, why not "BG"? "AY" Ray, and "CN" Cusson, O. K.; "DO" Orr, fair, but "AO" is easier to make and sounds much more classy. "GH" Alvina, should be changed to "NA." "CK" Cook represents the town all right, but sounds too much like check. To get the beautiful effect it would be necessary to give it an unusual call, such as "NZ," "G" Angora. Why not give it the snappy "N." "BR" Britt, good, "DI" Dispatcher, I suggest change to "DS," "WS" West Virginia yard office "YD," "VI" Virginia, can't kick on them; "BG" Ellsmere should be "MR," "FR" Taft, "HY" Harney, and "DU" West Duluth, O. K., "WN" West Duluth Passenger Station, the last station on the line, we want something better. For class, individuality, style, grace, harmony and ginger, let the call be "TH." The changes suggested would increase the just pride, graceful swing and beauty of calling and improve the service fifty per cent.

"DQ," whoever he is, is the sort of chap who gets more out of his job than the monthly pay check specifies. It is not likely that it has occurred to him at all, but "Telegraphy as a Handicraft" has an appeal for "DQ" that will bring to him on occasion thoughts which may tide him over rough spots or slippery places.

THE PACIFIC TELEPHONE AND TELEGRAPH COMPANY, on January 1, 1919, had a total of 680,705 company stations in service, an increase over January 1, 1918, of 11,235 stations.

BELL SYSTEM SUBSCRIPTIONS TO LIBERTY LOAN.—Bell System employees subscribed the following amounts to the four government loans: First, $3,850,900; second, $3,606,450; third, $8,141,950; fourth, $8,753,000. Twenty-five and four-tenths per cent. of all employees were subscribers to the first loan, 24.5 per cent. to the second, 55.6 per cent. to the third, and 50.3 per cent to the fourth.

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# EDUCATIONAL

## QUESTIONS AND ANSWERS DEPARTMENT.

### Current and Volt Meters.

W. E. F.—A milliameter or an ammeter should never be connected between the line wire and the earth. In using either of these instruments it should be inserted in series with the line wire. On the other hand, a voltmeter should not be inserted in series with the line, but should be connected directly between a line wire contact and the earth, or across the battery or machine generator. The internal resistance of the milliameter and the ammeter is very low, while the resistance of the voltmeter is high; in the one case an ohm or so and in the other thousands of ohms.

### Relay and Sounder Operation.

H. L. T.—The armature, or tongue, of a telegraph relay is so constructed that it will have as little weight as is consistent with the required mechanical strength. The reason for this is that the electric current in the main line circuit is only about one-twentieth of an ampere—a strength not sufficient rapidly to move a heavy armature such as that forming a part of the telegraph sounder.

The relay armature when it is operated opens and closes a local circuit in which but one sounder is connected and in which the current strength is about one-fourth of an ampere, or sufficient promptly to operate the comparatively heavy sounder armature.

If one-fourth of an ampere current were supplied in the main line circuit, relays would not be necessary, as a sounder will operate satisfactorily on that amount of current. However, it would require nearly one thousand gravity cells to maintain that current strength in a two-hundred mile line of iron wire. The voltage of a thousand cells would be very dangerous to life and could not safely be used in practice.

### Incandescent Lamps.

G. C. D.—The filament of an incandescent lamp will light up the same when alternating current flows as when direct current flows through it.

### Gravity Cells.

T. H. T.—In a gravity cell current flows from the zinc to the copper inside the cell and from the copper to the zinc element through the external circuit.

### Vibroplex Sending.

L. N. S.—The vibroplex, or wigwag transmitter, must be adjusted so that the duration of contact is long enough while making a dot to permit the battery to build up the current strength in the line sufficiently to operate the relay at the distant end of the line. On telegraph lines where ordinary sending keys are used, a current of about forty milliamperes is sufficient, but where the semi-automatic transmitter is used it is generally necessary to establish a sending current of sixty to seventy-five milliamperes.

### Simplex and Composite.

C. C. A.—When a circuit is arranged for simplex working two line wires are formed into a metallic circuit for telephoning, and the two wires thus connected are at the same time used as a single conductor for telegraph purposes, the earth acting as the return portion of the telegraph circuit. Suitable impedance coils are used at each end of the line to prevent grounding of the telephone currents.

When a circuit is arranged for composite working two line wires are used as a metallic circuit for telephone purposes, and the two wires are used, also, as two separate telegraph circuits. Suitable impedance coils are necessary. The telegraph circuits thus obtained may be single or duplex; or where conditions are favorable, quadruplex circuits.

### Wheatstone Bridge.

W. G. F.—The resistance coils associated with a Wheatstone bridge which are used to form the shunt circuits, are not connected into the A, B, or R arms of the bridge, but are connected around the galvanometer terminals. The purpose of the ratio, or shunt coils is to vary the sensitiveness of the galvanometer. The higher the resistance of the coil shunting the galvanometer the greater will be the proportion of the total current flowing through the galvanometer movement coil. As the resistance of the shunt is reduced a larger proportion of the current flowing will pass through the shunt, thus reducing the amount of current possible in the galvanometer coil.

### Internal Resistance of the Audion.

N. A. M.—The statement made on page 117 of the March 1 issue of TELEGRAPH AND TELEPHONE AGE, in describing the ultraudion reads: "The filament was heated to an unusual degree thereby reducing the internal resistance of the bulb." The fact that you question this statement shows that you are digging deep and that you are making good progress with your electrical studies.

The statement was intended to mean that when the incandescent filament is heated to an unusual degree the stream of ions passing between the filament and the grid is considerably increased in volume, the result of which is that the portion of the circuit between filament and grid then passes a larger current. As an increase in current signifies a reduction of resistance, the statement is substantially correct.

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## ELECTRO-PHYSICS FOR THE TELEGRAPH, TELEPHONE AND RADIO STUDENT.

This is the first of a series of articles to be published in this department of TELEGRAPH AND TELEPHONE AGE, which will present up to date instruction in elementary electrical engineering.

The subjects of land-line telegraphy, submarine cable signaling, telephony and radio signaling are today drawing close together. During the past year cable men, Morse men, radio men and telephone men have on several occasions assembled at joint meetings of the societies made up of these various branches of the art of electric communication.

It is our intention to publish a new series of articles dealing with the fundamentals of modern theories of electrical transmission, in words and terms that will enable the youngest or the oldest wire chief, or other students, to gain a working knowledge of present day tendencies in communication improvements.

This article will outline broadly the scope of the proposed studies, and in the articles to follow we shall deal in detail with the many problems here suggested.

Charles P. Steinmetz, one of the most advanced scientific investigators and writers, has explained by means of higher mathematics many of the phenomena which are likely to play important parts in future electrical development. We hope to be able to translate into understandable terms the deductions of Dr. Steinmetz and other scientists.

It has long been realized that the transmission of electrical energy is a phenomenon which takes place both in the space within the conductor and in the space surrounding it. The external phenomena are the most important, consisting of magnetic forces concentric with the wire and electrostatic forces radial to the wire. As the current initially rises in the conductor the magnetic flux travels away from the wire with the velocity of light. The flux in the immediate vicinity of the conductor is in phase with the current, but at some distance away it lags behind by the time element required for its propagation. Since the velocity of light is 188,000 miles per second, it requires only one ten-millionth of a second to travel 100 feet, and thus at the low frequency of 60 cycles per second the entire magnetic field about a transmission line, for example, would be substantially simultaneous with the current; but at millions of cycles per second, with a field extending hundreds of miles, there would be a definite formation of waves. At 1,000,000 cycles per second, for example, the wave-length would be 1,000 feet, and thus at points 500 feet apart the current in the wave would be flowing simultaneously in opposite directions.

In the case of low-frequency power transmission lines the wave-length is very great, and ordinarily the total length of the transmission line is but a small fraction of the full length of the wave. In the case of telephone lines, with an average frequency of 500 to 600 cycles per second, the wave length is about 400 miles, and thus in a New York-Chicago line there would be about two and one-half complete waves. At very high fequencies, amounting to several hundred thousands or even millions of cycles per second, the phenomena which take place in transmission seem to follow different laws, but in reality this is not true.

Transmission takes place in two ways, first, along the conductor by conduction, and then at right angles from it by induction. The latter is the cause of induced voltages in parallel or secondary conductors, and explains the transfer of energy to secondary systems. At low frequencies very little energy is transmitted by induction, nearly all of it being transferred by conduction. But at very high frequencies the conductively transmitted energy becomes small and the inductively transmitted energy becomes large, accompanied by rapid dissipation of the energy through space. The higher the frequency the more the energy tends to flow transversely from the conductor and less in the direction of the conductor. At extremely great frequencies the conduction practically vanishes, and we have pure wave transmission, as in wireless telegraphy. At a frequency of 100,000 cycles per second the wave-length is about 2 miles, and at 1,000,000 cycles per second it is only 1,000 feet; thus many succeeeding waves pass out into space before the first wave reaches its destination. Still higher frequencies than this can be produced by oscillatory discharges in tuned circuits, and at 4,000 million cycles per second the wave-length is only 2 inches. Frequencies as high as 20,000 million cycles occur sometimes in the discharges of multi-gap lightning arresters. It is an interesting fact that a sensitive coherer will always respond to the discharge of a multi-gap arrester, even at a distance of several feet.

At frequencies above this, the only observable phenomenon in wave transmission is the production of heat, and we come to the phenomenon of radiant heat. The heat radiated by a steam boiler is in reality the radiant energy of electric waves. At these enormous frequencies the wave length is so very short that the energy is necessarily limited. There is no known means of producing frequencies in the range from 10,000 million to 1,000,000 mil-

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lion cycles per second. Above the latter limit the waves are practically sent out by molecular vibration. At vibrations equal to 500 million million per second we come to the field of luminous waves, or light. Beyond this there are still higher frequencies in X-rays, the highest yet known. The total range from 25-cycle power transmission to X-rays is sixty octaves, and only six octaves in this range are unexplored or dark.

Wave reflection is a most interesting phenomenon to study; for example, the relatively long waves in wireless telegraphy pass as easily through a brick wall as light through glass, but light waves meet a solid obstacle in the same wall, partly because their length is such an infinitesimal fraction of the wall's thickness.

## Shop Talk.

BY THE OBSERVER.

It has been well said that "a little learning is a dangerous thing," and many may think that I am placing the realm of their studies too small. To such of you I will also quote another old saying: "It is better to know one thing well than a little about everything." Now all must admit that both statements require some modification and as I have stated it is really impracticable for any individual to be fully posted in the electrical world; therefore it logically follows that one should get as fully posted as is possible in the division to which his daily occupation carries him, and then use a reference library for such of the remainder as is necessary. By doing this, you will remove the stigma of being unlearned; prove that you are acquainted with one thing well and still have access to practically everything electrical. In some courses as promulgated by the various correspondence schools, geometrical and mechanical drawing is optional. Many side-step drawing thinking it is of no use, contenting themselves by saying their salary is better than that of a draftsman. That is a wrong premise, for to be a good engineer you should be able to draw to scale, sketch, read blue prints, etc., and if you follow the lessons of drawing as used by the schools alluded to, you will be able to do all of it. While I am on the subject I would urge all parents to try by every manner of kindness to encourage their children, especially the boys to form a special desire to excel in drawing and in mathematics. My reason for this is: it makes no difference as to which branch of business the boy in later life engages, the two subjects that I mention will prove their worth. To any of the boys in their teens, or to any man that expects to take up engineering, and finds he is deficient in these subjects would do well to specialize on each. Drawing and mathematics are to an engineer what steam is to an engine, the prime mover. There have been so many volumes written upon how to educate us that I feel too much like a tautologist, still I know there is so much disinterestedness shown by many in the field that if by any words of mine some good will ensue, then my labor shall not have been in vain. Another reason why I suggest that all should enroll in the educational course is simply this: Your studies will be arranged methodically and such being the case you will make better headway. When you send in your home task and it is approved then you know that you know, and when such a time comes you will be better able to select additional books for a reference library. Too many purchase a technical book, read over it like they would a newspaper, throw it aside, condemning the book as no good, purchase others, finding them worse, and wind up by having spent plenty of money, but not enough of time. Technical books often require that only a page be studied at a time, then reflect; for Edmund Burke says: "To read without reflecting is like eating without digesting."

*(To be continued.)*

## Efficiency Engineering.

*(Continued from page 118, March 1 issue.)*

"What is efficiency, and how does it apply to the management of the telegraph or telephone company?" is a question frequently asked. The best answer to this question is to make a comparison with the old and the new methods of conducting business. The old-time telegrapher, the fellow who goes back forty to fifty years, is proud of referring to the beautiful pen copies turned out by him and his associates in the good old days when salaries were based in part on beautiful copy. Efficiency in time demanded the substitution of the typewriter for the beautiful pen copy in all of the large commercial offices. It is true that in the smaller offices and the railroad stations generally pen copies on telegraph blanks are the rule, even to the present time, and not the exception, as many suppose. Here again efficiency asserts itself.

It is highly efficient for a telegraph operator working a busy wire to receive his messages on a typewriter. It is not efficiency for an operator in a small town who has only a few messages to handle each day, and where he has several wires to look after, to use a typewriter. While he is carrying the machine from desk to desk to receive the messages he is losing valuable time.

Note again how efficiency asserts itself in an office where one operator is kept busy all of the time exchanging business on a half a dozen or more wires and where the office is large enough to maintain a wire chief. The operator sits at one desk in front of his typewriter, and the wire chief, as the calls come in, switches the wires to the desk where the operator clears up the business, and when he completes his work on one circuit another wire takes the place of the one cleared, and in this way efficiency is best illustrated when it is realized that an operator under such conditions works as many as twenty or more different wires in the course of a day without leaving his desk.

In a busy bookkeeping department of all telegraph and telephone companies will now be found adding machines. This is efficiency. What would be thought of the head of a bookkeeping department if he showed a preference to return to the

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old method of adding columns of figures mentally instead of by machinery? One adding machine will do the work of many clerks. The machine does its work with unfailing accuracy. Careful clerks always add up columns of figures at least twice. If, both times the result is the same, the footing is concluded to be correct. If there happens to be a difference, however, the column of figures has to be added the third and sometimes the fourth time. This is inefficiency, and would not do in these days of speed and progress. At the same time it would be inefficient for a man in a small office to expect the company to furnish him with a costly adding machine when the footings of his total day's business could be added in five or ten minutes.

A few years ago the general superintendent of a prominent railroad system was retired because he refused to install a telephone in his office. His argument was that he had conducted the business of the railroad system for the previous twenty-five years to the satisfaction of all concerned, and he had no use for innovations. The telephone would cost his company a few dollars per month and it would save the services of at least two clerks who would be required to do the work accomplished over the telephone. This official was inefficient. There were and are many others like him in their ideas.

It will be observed that economy is always closely related to efficiency, so that efficiency in reality reduces the cost of production and insures accuracy in results. No one can get away from efficiency methods if he wishes to be up to date. What we call efficiency today we may term inefficiency tomorrow. The progress of the times regulates matters of this nature.

Previous to 1860, if a man wanted to go from New York to California overland, he would have to travel the greater portion of the distance in stage coaches, and it required at least thirty days to make the journey. Efficiency demanded speedier transportation facilities, and now the same journey is made on fast passenger trains in from four to five days. This is efficiency, and whichever way we turn we bump into this magical word.

The efficiency engineer is in demand wherever persons are employed. His services are invaluable to the employing interests. The reduced receipts incident to a dull season are offset by the efficiency engineer introducing reductions in expenses equal to the losses. Large and small corporations are thus enabled to maintain their earning power. In the late forties and early fifties the telegraph wires from Washington, Baltimore and Philadelphia entered New York City from high masts located on both sides of the river where the land was highest. Efficiency suggested a substitute for this uncertain method of maintaining communication between New York and the south; river cables were the result. At one time there was only one telegraph office in the city of New York, and it was located on Wall Street. In the course of time it was expedient to establish branch offices uptown to take care of and influence new business. This was efficiency on the part of those in charge of the telegraphs in the early days, and since that time to the present moment engineers and inventors have been busy night and day in the production of efficiency methods to increase receipts and reduce expenses. For evidence of how well they have succeeded it is only necessary to look about us. The early telegraph and the early telephone apparatus were the subjects of wonderment in their day. The same apparatus is now found only in museums. Efficiency engineering is responsible for all development in the industries.

*(To be continued.)*

## Length of Service.

BY J. E. HALL, RICHMOND, VA.

In the telegraph business there are many lines, and all have attractive features and many followers.

As a rule but little is said of the attractiveness of continuity of service, yet this appears to the writer to be among the most attractive and valuable and is open to all alike. Many lean to the belief that it affords a type of satisfaction a little better, a little richer, than that obtained in any other way.

In all lines of human endeavor length of service is not only complimentary to the employee, but to the employer as well; whether individual or corporation. Not only does it enrich the moral and mental side of one's life, but to those working where pensions are paid it becomes a matter of dollars and cents, since pension benefits are calculated largely by length of service.

In these times of large salaries, especially in new and untried fields, it would be well to remember that "All is not gold that glitters," therefore the writer sincerely hopes that no telegraph employee will sacrifice length and continuity of service with a strong and dependable corporation with generous pension and vacation features for a little more money with a less dependable and less generous concern.

"Look before you leap," fellow employees of the telegraph, and it may save you some heart aches.

## Learning to Telegraph.

There are today so many possible applications of a knowledge of the telegraph alphabet that it is not difficult to understand why so many students are familiarizing themselves with this highly useful method of communication.

In the later stages of his education the telegraph student requires the guidance and advice of an expert operator, but to learn how to receive Morse signals requires that the student have at his command the services of a sender who will exercise patience and who will be available whenever the student has a few minutes to practice. The automatic sending machines manufactured by the Omnigraph Company furnish the student with just this kind of instruction for learning either the American Morse or Continental alphabets.

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## THE TELEPHONE.

### South American Telephone Apparatus Requirements.

In Brazil there are a number of telephone companies, some of which are provided now with modern equipment, although most of the smaller ones will be in need of new material to take care of natural expansion. The more important companies are located in Rio de Janeiro and São Paulo and are owned by the Brazilian Traction, Light and Power Company. They have about 40,000 subscribers and use American material. Their yearly increase is approximately 10,000 instruments in service, most of which are European made.

In Chile the two largest stations are in Santiago and Valparaiso, and since they are owned by German capital, their whole influence has been used to exclude material other than that of German manufacture.

There are several smaller independent telephone companies, but most of the more important places are controlled by the Chile Telephone Company, an English concern with headquarters in Santiago. It is preparing to replace much of the older equipment with more modern material.

In Argentina a large number of small telephone companies operate in the various towns and cities and have a total of approximately 50,000 subscribers. The better organized companies are using American material, especially the Union Telephone Company of Buenos Aires, which is modern and up to date in equipment.

In Uruguay the telephone companies, of which there are approximately twenty, are now owned privately, but the government intends to take them over, under its policy of declaring all public utilities to be state monopolies. There are approximately 18,000 instruments in use, of which 10,000 belong to the two companies operating in Montevideo. The larger of these, an English company, with 8,000 subscribers, uses American material.

### The Bell Telephone Company of Canada—Annual Report.

The annual report for 1918 of the Bell Telephone Company of Canada has been issued and is one of the first reports received of Canadian public utility companies showing conditions existing at the termination of the great war, which during four and a half years required to the full the exercise of the Dominion's energies along a single line of effort. The report says:

"The financial condition of the company made it desirable to restrict expansion within the limits of absolute necessity, and to continue the policy of development pertaining to war or war industries. Nevertheless, we show an increase of 18,944 stations during the year, and have met all such demands, and other demands in the public interest. As showing the difficulty of procuring apparatus, it may be mentioned that it is necessary to order switchboards two years in advance to secure delivery.

"2,888 miles of wire were added to the long distance system in 1918. The long distance lines now owned and operated by the company comprise 85,303 miles of wire on 9,441 miles of poles, and 6,615 miles of wire in underground and submarine cables.

"Eight hundred and thirty-three of our employees enlisted for military service abroad, and 584 were still so serving at the close of the year. 79 have laid down their lives, 4 are missing or prisoners and 166 have been discharged from military service. The company promised re-employment to all permanent employees in the service prior to the outbreak of the war who enlisted, and this promise has been and will continue to be met.

"The policy of freely interchanging business with noncompeting companies has been continued, and 703 local telephone organizations, serving 95,957 subscriber stations, have established reciprocity of service by contracts mutually satisfactory. In addition, interchange under conditions laid down by the Board of Railway Commissioners for Canada has been effected with three competing companies, operating 2,894 stations."

On December 31 the company had a total of 303,205 company stations in service, in addition to 99,708 connecting and miscellaneous stations. Number of miles of wire was 894,367; central offices, 428; number of employees, 10,115. The average daily exchange connections during 1918 were


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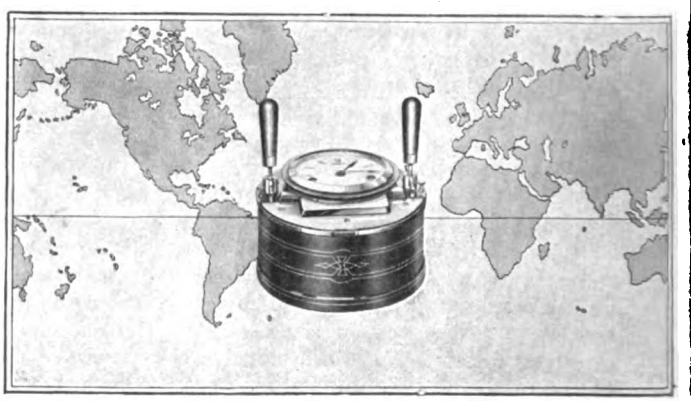

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2,432,065, and the average daily long distance connections 27,753.

The officers are: L. B. McFarlane, president; C. F. Sise, vice-president and general manager; W. H. Black, secretary; W. G. Slack, treasurer; and E. Palm, controller.

### Telegraph and Telephone Life Insurance Association.

The annual meeting of the Telegraph and Telephone Life Insurance Association, which took place at 195 Broadway, New York, on Wednesday afternoon, March 12, was one of the most important gatherings in the history of the association. Mr. N. M. Giffen was elected secretary of the association. Since the death of M. J. O'Leary he had been acting secretary.

The officers elected are: James Robb, president; Charles P. Bruch, first vice-president; Thomas E. Fleming, second vice-president; Nathaniel M. Giffen, secretary; Louis Dresdner, treasurer.

The executive committee consists of the officers and Edward J. Nally, J. F. Nathan, F. D. Bermke, Gardner Irving, Thomas M. Brennan, Walter C. Humstone and A. R. Brewer.

The members of the advisory board are: B. E. Sunny, H. J. Pettengill, W. T. Gentry, Edward Reynolds, A. L. Salt, H. C. Worthen, Thomas W. Carroll, A. B. Cowan, G. W. E. Atkins, Jed G. Blake and Harvey D. Reynolds.

## INDUSTRIAL.

E. KLEINSCHMIDT, president of the Kleinschmidt Electric Company, Inc., New York, manufacturer of telegraph printer apparatus, announces the appointment of Paul Hetenyi as general manager of the company, to succeed R. H. Whitehead, resigned.

### Electrical Education.

A large proportion of the graduates of the large universities which give electrical courses, when they leave college, enter the laboratories of the large industrial companies, and government electrical bureaus.

In the managing, construction and installation departments of operating companies and manufacturing companies there is a growing demand for practical electricians; men qualified to take up the task of getting work done. Telegraph and telephone employees living in towns and cities throughout the country, and who desire to enter the broader fields of the electrical industries, have open to them the thoroughly practical scheme of coming to New York, securing day work or night work in their regular line, and then taking up during their hours off duty a course such as that conducted by the New York Electrical School.

## ANNUAL REPORT FOR 1918 OF THE BELL TELEPHONE SYSTEM.

According to the report for 1918 issued by the American Telephone and Telegraph Company, the year was from every standpoint the most strenuous and difficult in the whole history of the telephone. It has been impossible to maintain standards and difficult to meet the increasing demands for service, greatly augmented at all centers where war industries and activities concentrated. About 14,000 employees of the telephone system entered military service. Over 20 per cent. of the expert staff were taken over by the government for special or active war service.

Of particular interest is a letter to Mr. Vail from the Secretary of War, appreciative of the "splendid spirit of co-operation" of the Bell engineers in the development of the airplane wireless telephone set and other important apparatus used in the war.

#### FACTS ABOUT THE BELL SYSTEM.

At the end of the year there were 10,992,325 telephones connected with the Bell System, which owned 7,200,000 and connected with about 3,800,000 owned by connecting companies and rural associations.

The wire mileage owned by the Bell Companies was 23,281,150 miles, 94 per cent. copper, and 60 per cent. underground. The net amount added to plant and real estate was $77,922,631. The total provision for depreciation of plant during the year was $54,000,000.

The capital obligations of the Bell System outstanding in the hands of the public at the close of the year were $991,074,264, of which the outstanding obligations of the American Telephone and Telegraph Company represents $676,283,362 and those of the associated companies, $314,790,902. The telephone plants stand on the books of the companies at $1,142,815,341, and appraisals by public authorities indicate a greater actual value. The surplus and reserve aggregate $340,000,000, an increase of over $36,000,000.

In six years the expenditures from employees' benefit funds have amounted to $10,534,594.

#### AMERICAN TELEPHONE AND TELEGRAPH COMPANY.

The net earnings of the American Telephone and Telegraph Company for the year were $54,293,016. The interest charges were $10,391,694, and the dividends at the regular rate of 8 per cent. per annum were $35,229,698. Of the resulting balance $5,000,000 were appropriated for contingencies and $3,671,622 added to surplus.

The number of stockholders increased over 25,000 during 1918, and now exceeds 112,000, the majority being women. The average holding is 39 shares.

Of the total share capital issued since the American Telephone and Telegraph Company took over the operations, about one-half has realized for the treasury, through exchange for convertible bonds and cash, from 20 per cent. to 33 per cent. premiums.

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ENGINEERING ACCOMPLISHMENT.

The report makes a remarkable showing of the engineers of the Bell System, which includes the Western Electric Company, Inc. Many went into the army and navy and those remaining were charged with tremendous tasks, both civil and military. Much of their work, performed under the oath of secrecy during the war, has but recently been made known.

The complete military telephone system was constructed in France. The Bell System largely provided the technically skilled men to execute this work and its engineers assisted and co-operated with the signal corps in designing the system. Hundreds of girls were specially trained by the Bell Companies to operate this system, and reports show that they played an important part in achievements of the American army.

Wireless telephone sets for communication between airplanes and between the ground and airplanes, as well as for use on navy hydroplanes and submarine chasers, were perfected by Bell engineers. An unbreakable secret cipher was developed for the telegraph printer and adapted to other means of transmission. They worked out apparatus for the detection and location of invisible airplanes and for locating accurately the position of enemy artillery.

Faced with a shortage of men, of operators and of material, the engineers devised new methods and new apparatus to overcome these deficiencies.

Special mention is made of the multiplex telephone and telegraph system by means of which five telephone conversations or forty telegraph messages may be carried over a single pair of wires. The economy of this system for long lines is obvious, and while its application is necessarily gradual, it is already in use and its use will be extended immediately.

GOVERNMENT CONTROL.

The terms of the contract with the government are presented for the information of the stockholders. The provisions include emergency compensation, efficient operation, full provision for maintenance, depreciation and obsolescence, the investment of unexpended balances in the plant, continuance of employees' pensions, disability and death benefits, and of contracts with the associated companies.

These provisions are for the protection of the property, the service and the art. The security holders are assured of the payment of interest and dividends on existing securities and securities hereafter authorized, and compensation by the postmaster general for such extensions as he may require to meet abnormal conditions.

Mr. Vail explains that government control under authority of the joint resolution of congress is in no sense permanent, for the property is to be returned after a limited period.

---

The old wire chief says: "A cool head is an indispensable possession to the man at the board."

## SUBMARINE CABLE SERVICE TO CENTRAL AND SOUTH AMERICA.

The Central and South American Telegraph Company has ordered a sufficient amount of submarine cable from the Telegraph Construction and Maintenance Company, London, for its connection between Argentina and Santos and Rio de Janeiro, Brazil. It is expected that these connections will be installed and in working condition before the end of the present year.

The company heretofore and at the present time is transferring its United States-Brazil traffic to the Western Telegraph Company, a British cable company, at Buenos Aires for forwarding to places in Brazil. Upon completion of its new extensions to Santos and Rio, the service will be greatly expedited, as there will be but one retransmission between New York and Santos and Rio, Brazil; that is, at Valparaiso, Chile.

NEW HEADQUARTERS BUILDING FOR "ALL AMERICA CABLES"

Telegraph service to South America was founded in the year 1880 by the late James A. Scrymser, who commenced laying the first cable from Galveston, Tex., toward Central and South America in 1881. The development of this system is a tribute to both its founder and to the progressive spirit of those who have long been connected with the company.

In the early days, cable communication between the United States and South American countries involved handling of traffic by three separate companies, the cables comprising the present "All America" system, the lines of the West Coast Tele-

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graph Company, and of the Transandine Telegraph Company, the latter company operating the lines across the Andes mountains from Valparaiso, Chile, to Buenos Aires, Argentina; the rate prior to the establishment of the joint service being $7.50 gold per word.

The "All America Cables" service via Colon has developed from a single cable in 1907 to the present two duplexed cables, operated from New York City and connecting all South American countries by means of a thoroughly modern system of submarine cables equipped at terminals with the latest mechanical improvements to insure the maximum of speed with the minimum of error.

From New York the two duplexed cables extend to Colon, touching at Guantanamo, Cuba. These cables continue across the Isthmus of Panama through duplicate underground cables uniting with cables at Panama, extending down the west coast as far as Valparaiso and serving the Republics of Colombia, Venezuela, Ecuador, Peru, Bolivia and Chile.

From Valparaiso, Chile, the lines in triplicate extend to Santiago, and also across the Andes to the city of Buenos Aires, Argentina.

"VIA GALVESTON."

From Galveston, Tex., there are triplicate cables to Vera Cruz and Puerto Mexico. These cross the Isthmus of Tehuantepec and extend down the west coast of Central America as far as Panama, there connecting with the cables previously described. From Vera Cruz there is a duplicate land-line to the City of Mexico. Messages to and from Mexico are received from or delivered to connecting lines at Galveston, Tex.

The All America Cables system provides a cable service of exceptional importance to the Republics of the United States, Mexico, Central and South America. No single agency has done more toward the development of commerce between the three Americas and in fostering friendly relations between the citizens of these republics than this system.

The company owns two specially constructed cable repair ships, one of which, the *Relay,* 1,180 tons, is stationed at an Atlantic port, and the other, the *Guardian,* 1,750 tons, at a port on the west coast of South America, both ready at a moment's notice to steam away to any break which may occur, sometimes repairing breaks at depths of 18,000 feet. On one occasion during the past year when one of these vitally important links in the commercial and political world relations of the Americas was interrupted in the Atlantic Ocean, it was repaired within forty-eight hours, although the presence of enemy submarines in the immediate neighborhood was common knowledge.

The conditions brought about by the late world war taxed the company's facilities to the utmost, but under the guidance of its president, John L. Merrill, and his able staff of experts, a service was maintained, the efficiency and reliability of which brought forth appreciative comments from those whose business is dependent upon the maintenance of communication with Central and South America.

NEW HEADQUARTERS BUILDING IN NEW YORK.

Herewith is reproduced an elevation plan of the new building on Broad Street, between South William and Stone Streets, New York, now nearing completion, and which will contain the executive and main offices of the All America Cable System.

The building will be ready for occupancy early in June this year, and will permit the bringing together under one roof of all departments which now are located at 64 Broad Street and at 66 Broadway.

The company's aim is to co-operate with the Pan-American governments and merchants in fostering better trade relations between the United States and Central and South America.

LIEUTENANT EDWARD S. HOWE, Engineers, U. S. A., following his discharge from the army, will proceed to the Philippine Islands, where he will act as a commercial engineering representative of the Westinghouse Electric and Manufacturing Company. Lieutenant Howe was born in Kingston, Mass., and was graduated from the electrical engineering course of the Massachusetts Institute of Technology in 1910. After a period of service in the shops and Boston office of the Westinghouse company, he spent two years at Medillin, Colombia, South America, returning to the United States early last year to enter the national service.

**The Hidden Key.**

"One day I fell into a brown study—determined to do something. The result of my cogitations was that I rummaged in the locker and produced an old Morse key which I had brought to B—— with me, thinking perhaps it might be of use. This I proceeded to fix up in a corner under the operating table, connecting it into the main line circuit exactly as the regular key on the table was connected. The table stood against the wall, directly under a window, and it was so dark under the table that there was absolutely no danger of discovery. Then, at odd times, I practiced sending with my foot. I found the process of sending in that manner not half so difficult as one would suppose. I persevered until I became quite proficient in this novel method of transmission.

"It was not more than a day or two after I had decided that my foot was sufficiently versed in the new art to do business that an opportunity presented itself. It was after supper. The last train of the day had passed, and just as I——"

You can read it yourself. It is one of the sixty telegraph stories in the book "Lightning Flashes and Electric Dashes." Every telegrapher should have a copy. It will start you writing stories from your own experience.

The price is $1.15 per copy. For sale by TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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### Death of Colonel William Bender Wilson.

Colonel William Bender Wilson, aged eighty years, president of the Society of the United States Military Telegraph Corps, died at Holmesburg, Philadelphia, Pa., February 27, after an illness of several months. Colonel Wilson was born at Harrisburg, Pa., and entered the service of the Atlantic and Ohio Telegraph Company as a messenger boy in 1852. A year later he was an expert telegrapher. He identified himself with the Pennsylvania Railroad service in 1854, since which time he had remained loyal to that great corporation, until about twenty years ago, when he retired from active service.

In 1860 President Scott of the Pennsylvania Railroad Company loaned Mr. Wilson to the government, and during the Civil War he was closely identified with the United States Military Telegraph Corps and was intrusted with many important undertakings. Upon the authority of Governor Curtin of Pennsylvania Mr. Wilson opened the first telegraph office in the world for military purposes at Harrisburg, Pa. Mr. Wilson was appointed manager of the military telegraph office in the War Department, Washington, on May 3, 1861, by President Lincoln. A year later he was made a secret service telegraphic scout, and on many occasions rendered important and delicate service to the government.

At the close of the war Colonel Wilson returned to the Pennsylvania Railroad service as superintendent of transportation, which position he retained until his retirement. He was a member of the Philadelphia city council for several terms and had devoted much time to political as well as literary pursuits. He was the author of several books on military and railroad affairs.

Mr. Wilson was made a colonel of volunteers by the legislature of Pennsylvania, which body also awarded him a gold medal for meritorious service performed in the interest of the state and nation. He is survived by his wife, three sons and a daughter.

### Death of Frank Tremble.

As announced briefly in our March 1 issue, Frank Tremble, superintendent of telegraph of the Texas and Pacific Railway, was killed in a motor track-car accident on February 21.

Mr. Tremble, with W. A. Roberts and D. A. Temple from the Dallas office, left Dallas by gasoline motor car early on the morning of the 21st, to make an inspection of the telegraph lines. The car was running for a switch to be turned onto the tracks of a branch line to allow an approaching passenger train to pass by. It is said that Mr. Tremble was standing lookout in an effort to sight the approach of the train, and although it was thought there was plenty of time to switch the car from the main line before the train arrived, Mr. Tremble either jumped or fell from the car and it is believed that his death resulted from the fall upon the rail. The car was stopped and an attempt made to remove the body before the approaching train reached the spot, but the time was too short; the engine of the express knocked the gasoline car from the rails and struck Mr. Tremble's body.

Frank Tremble's death is a serious loss to telegraphers. He was the type of railroad official who could exercise broad gage ideas of service and of co-operation. The waiting list in his office has for years past contained the names of many operators who wanted to connect with the Texas and Pacific Railway under Frank Tremble. He had the pick of the good telegraphers and as a general thing was, in good service, well repaid for his fairness.

In Helen Gould, now Mrs. Finley J. Shepard, Frank Tremble found a benevolent sponsor for his rule regarding free transportation for telegraphers seeking employment. It is not likely that the privilege was often abused, and undoubtedly the goodwill gained in this way made many friends for the railway system which he served so well.

Mr. Tremble had been in the service of the Texas and Pacific Railway thirty-five years, and was appointed superintendent of telegraph in 1901.

---

WILLIAM HIER, construction foreman in the service of the Commercial Cable Company, New York, died February 6. Mr. Hier had been in the company's employ more than thirty years.

MRS. NELLIE DOUGHERTY COLLINS, née Nellie Dougherty, in the late seventies and eighties one of the best lady telegraphers in the New York main office, died at Sag Harbor on February 20. Before her marriage Miss Dougherty worked the most important circuits in the New York office. During her married life of over thirty years she retained her love for the profession and occasionally attended telegraph social functions. She was a member of the Old Time Telegraphers' and Historical Association and a frequent visitor in New York.

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H. W. DEALY, Secretary,
195 Broadway, New York

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# Telegraph and Telephone Age

No. 7 NEW YORK APRIL 1, 1919. Thirty-seventh Year

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BACK NUMBERS of this journal three or more months old will be charged for at the rate of 25 cents per copy.

NEW YORK, APRIL 1, 1919.

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### The Telegrapher in War.

During the past few months we have published several original accounts of the part played by telegraphers in the battle fields of France, and we are reminded that from the early days of the art telegraph operators have performed deeds of heroism in warfare equal in importance to the achievements of the first line fighting men themselves.

The telegraph in war up to the time of the Civil War in America has not played an important role in the schemes of strategy, but the patriotism, pluck, and intelligence of American operators soon demonstrated that it is a highly valuable arm of the military service.

A veteran of the Civil War recently related that at the first battle of Bull Run, C. W. Jacques, a telegrapher, was stationed on the military lines at Springfield, sending reports of the battle's progress, and when the rout began and continued, and demoralization filled the atmosphere, Jacques cooly remained at his post, keeping the War Department advised of the startling events that were transpiring before his eyes. He remained at his post all through the terrible Sunday night, saw the remnant of the Union Army, torn and bleeding, pass by, leaving his position only when ordered to do so by the War Department; and that was twenty-four hours after McDowell and his staff had reached Washington and the army rested in safety in the entrenchments around Alexandria.

Again, at Yorktown, when the position was evacuated during McClellan's Peninsular campaign, operator D. B. Lathrop was sent from McClellan's headquarters to seek out and destroy electrical connections in a suspected field of torpedoes. The army halted while Lathrop went forward, found the circuits, and in his efforts to break the connections stepped upon a half-buried torpedo, and although he thereby lost his life he disclosed the field of danger and saved the army in his rear.

In Rosenkranz's Chickamauga campaign, when Bragg drove Rosenkranz's army in a panic on to Chattanooga, Jesse H. Bunnell and three other telegraphers covered the rear guard of the retreating army and under fire of the pursuing enemy, cut the lines of telegraph communication every few hundred feet; later opening up communication with Chattanooga enabling Rosenkranz to gain an intelligent idea of the enemy's progress and to take the necessary steps for the protection of his forces.

After Beauregard had evacuated Manassas, Edward Conway, a telegrapher from Canada who had joined the Military Telegraph Corps of the Army of the Potomac, proceeded to Manassas Junction and opened a telegraph office in a temporarily uninhabited coffin.

While he was endeavoring to communicate with the Union forces an enemy cavalry scouting party, watching McClellan, appeared in the operator's immediate neighborhood. In this emergency Conway interred himself in the coffin with his faithful key and relay, shifting the lid into position overhead, and from there communicated the situation to the authorities in Washington.

Later, on the upper Potomac, at a point where the enemy was attempting to cross the river, Conway established a telegraph office in a shanty, from which he kept up communication with headquarters until the shanty was riddled with bullets; remaining there, in fact, until an enemy patrol rode up to the front door of the place for the purpose of putting the "closed for the day" sign on that telegraph office. At this point Conway bolted out of the rear window (or where the window had been) and succeeded in making his escape.

When the complete history of the Great European War is written, undoubtedly the exploits of "Signals" will enliven many a page.

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# CURRENT EVENTS

## Executive Office Announcements, Personal Mention, Appointments

### PERSONAL.

FRANKLIN J. SCHERRER, secretary to COLONEL ROBERT C. CLOWRY, formerly president of the Western Union Telegraph Company, New York, was in Omaha, Neb., on business last week.

DAVID J. LEWIS, on March 8, resigned from the general wire control board created by the Postmaster General, to devote his entire time to his duties as a member of the tariff board. Mr. Lewis will continue as a member of the committee on standardization of telegraph and telephone rates.

MAJOR GENERAL JOHN F. O'RYAN, Commander of the 27th Division, United States Army, just returned from France, was at one time identified with the Legal Department, Western Union Telegraph Company, 195 Broadway, New York, serving as messenger and clerk under George H. Fearons, Counsel.

LIEUTENANT JOHN T. GIBBONS, of the 420th Telegraph Battalion, A. E. F., who has been in France since September, 1918, expects soon to return home. Prior to leaving for the fighting front Lieutenant Gibbons was stationed at the College of the City of New York, in charge as instructor of classes in advanced telegraphy.

GEORGE H. SICKLES, in the service of the United Press and Associated Press continuously during the past forty-seven years, has been retired on pension. In recent years Mr. Sickles has been stationed in Philadelphia, Pa. With his family he will make his home near Leeds, N. Y., where he has acquired some real estate.

J. W. FREELAND, the well known former old-time telegrapher and a member of the United States Military Telegraph Corps during the Civil War, and a resident of Marion, Ohio, is again at his home from the Lakeside Hospital, Cleveland, where he was confined for some time.

### POSTAL TELEGRAPH-CABLE COMPANY.

THE GUARANTEE TRUST COMPANY, New York, now acts as transfer agent for the Mackay companies.

J. S. GREEVER, manager at Chattanooga, Tenn., has resigned to enter the service of Lewis Burke and Company, brokers, with offices in Chattanooga. Mr. Greever has been connected with the Postal Company twenty-five years, the past fifteen years as manager of the Chattanooga office.

H. M. KELLEHER, formerly manager of the Stock Exchange, Pittsburg, Pa., office of this company, was married on March 4 to Miss Charlotte Algo Kelly. Mr. and Mrs. Kelleher have gone to Wichita Falls, Tex., where they will reside.

MANAGERS APPOINTED: B. H. Taylor, Haverhill, Mass.; G. M. Reynolds, Mattawamkeag, Me.; M. A. McKeown, Council Bluffs, Iowa; E. M. Cox, Oshkosh, Wis.; Mildred Speck, Morristown, Tenn., and R. J. Van Houten, Long Beach, Cal.

### New Tariff Book Issued by the Postal Telegraph-Cable Company.

The 1919 issue of the Postal Telegraph-Cable Company's tariff book is now being distributed to the company's offices.

The book contains 370 pages, and in addition to a complete list of points reached by the lines of the company in the United States and Canada, there is incorporated complete instructions in regard to message rates on government, commercial and press telegraph traffic, as well as rules for the guidance of employees in the receiving, delivery, and operating departments.

The excellent feature introduced several years ago of printing the instructions relating to the money transfer service on green paper, cable traffic instructions on pink paper, and operating rules on yellow paper, has been continued. This convenience facilitates the finding of particular information, obviating the necessity of thumbing through many pages in order to locate desired records.

The work was done under the direction of Isaac Smith, superintendent of tariffs.

### WESTERN UNION TELEGRAPH COMPANY.

"THE TELEGRAPH IN MODERN BUSINESS" is the title of a new booklet issued under the direction of Vice-President in charge of Commercial, J. C. Willever. The work is a handbook of live suggestions for business men and should find a distinct field of usefulness as a stimulator of new ideas and increased efficiency.

CHARLES W. BIGELOW, of Vice-President Yorke's

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office was, on March 16, installed as an elder in the Fort Washington Presbyterian Church, New York.

O. J. NOURSE, of Vice-President Fashbaugh's office, returned recently from the Atlantic cable stations in Nova Scotia and NewFoundland.

S. L. BURTS, division traffic superintendent, Atlanta, Ga., is in New York on business connected with his division.

J. P. EDWARDS, division traffic superintendent, Chicago, was a visitor in New York during the past week.

W. H. JACKSON, during the past nine years chief clerk to the district superintendent, Postal Telegraph-Cable Company, Birmingham, Ala., has been appointed district commercial manager of the Western Union Telegraph Company, with headquarters at Jackson, Miss.

W. R. EDMONDSON, mnnager at Sacramento, has been advanced to the managership of the San Francisco office, and the vacancy at Sacramento has been filled by the appointment of F. A. Bennett, formerly manager at San Diego.

## American District Telegraph Company.

At a special meeting recently held by the American District Telegraph Company of New York, it was voted to dissolve the company. It is planned in April to distribute a portion of the assets to stockholders. Because of existing contracts with the city all of the available assets cannot be distributed at this time. Dissolution of the company follows the purchase of its principal property in 1918 by the Western Union Telegraph Company.

## Western Union Income of $10,466,907 for Year 1918.

The annual report of the Western Union Telegraph Company for 1918 shows a balance available for dividends of $10,466,907, as compared with a balance of $11,715,866 in the preceding year. The income account shows the division between private operation of the lines and the government operation. During the seven months ended July 31, when the company was still under private control, the gross operating revenue was $54,283,410, and the operating expenses amounted to $46,004,926. The operating revenue for the full year of 1917 was $76,995,511 and the expenses $62,783,006.

The income of the company last year was added to by the government compensation, which amounted to $3,327,112, this applying to the land lines only, from August 1 to December 31. The surplus of the company at the close of last year was $32,518,993, as compared with $29,248,410 at the end of 1917.

## New York Western Union.

F. R. HUPPE, dispatcher in charge of traffic at 24 Walker Street, was for several years assistant chief operator in the main office of the Postal Telegraph-Cable Company, New York. Mr. Huppe's department is one of the busiest centers in the big main office.

AMONG RECENT VISITORS to this office was W. E. Stimpson of Washington, D. C. He was greeted by all of his old friends.

W. B. STARK, testboard attendant of the Buffalo, N. Y., office, is now located in this department His numerous friends here gave him a hearty welcome.

THE SECOND ENTERTAINMENT AND DANCE of the Western Union Educational Society took place on March 17, on the eleventh floor of the 24 Walker Street building, about seven hundred persons being in attendance. F. A. Hoag, president of the society, in a pleasing address outlined the future objects. It is the intention, he said, to rearrange the society into various clubs, including social, musical, athletic, languages, etc., and to elect a good live head for each. At various times debates among the clubs will be held. According to Mr. Hoag, those who did not get the opportunity of going "over there" will be able to learn to *parlez vous*. A French club with a French instructor is to be formed. Music was supplied by the Skidmore orchestra, which did itself great credit. Refreshments were served, and all were unanimous in declaring it an enjoyable evening. The next meeting will be held the latter part of April.

THE BOOKKEEPING DEPARTMENT will hold an entertainment and dance on April 4, when a good attendance and pleasant time is anticipated.

HAMILTON FITCHETT, a prominent member of the force for many years, who retired on pension some time ago, died on March 20. He was born at Troy, N. Y., eighty years ago. He became an operator in 1856. After serving as operator in the United States Military Telegraph Corps in Washington, for a time, he entered the service of this company in 1864 at 145 Broadway, soon after accepting the position of superintendent of telegraph of the Hudson River Railroad Company, with headquarters at Poughkeepsie. After holding various other positions of importance he returned to the Western Union service in 1892, since which time and until his retirement he held various positions in the general operating room.

## New Orleans Western Union.

THE NEW ORLEANS-MOBILE local circuit was, on March 1, turned over to Morkrum printer operation.

C. H. H. COTTRELL is making a tour of the Gulf Division on work connected with the Employees' Association.

J. H. ROONEY, chief delivery clerk, has strengthened his delivery force by adding a number of middle-aged men to his staff of messengers.

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C. L. WILKERSON is president of the local organization of the Association of Western Union Employees at New Orleans. Mr. Wilkerson is a telegrapher of long experience and has worked in many of the large telegraph offices throughout the country.

### The New York Telegraphers' Aid Society.

The annual election of the New York Telegraphers' Aid Society was held in room 1803, 24 Walker Street, New York, on March 25.

The officers elected to serve during the coming year are: President, A. M. Lewis; vice-president, E. F. Howell; treasurer, T. M. Brennan; financial secretary, C. A. Kilfoyle; recording secretary, Mary E. Saunders.

The members of the executive committee, elected are: William J. Quinn, F. J. Sheridan, W. W. Price, J. N. Kelly and Miss E. W. Hons. Auditors to serve during the ensuing year are: F. J. Nurnberg, J. F. E. Hopkins and H. M. Heffner.

### Old-Time Telegraphers and Historical Association.

W. H. CANNIFF, of Cleveland, Ohio, president of the Old-Time Telegraphers and Historical Association, states that he will soon have the local committees of the association in working order preparing a program of entertainment for the reunion of the Old-Time Telegraphers and Historical Association and of the Society of the United States Military Telegraph Corps, which will take place in Cleveland this summer or fall. This will be the first gathering of the old timers since the New York reunion, which was held in September, 1917. Now that war conditions are no longer a vexatious problem, it is thought that these reunions should again be held each year, and thus enable the pioneers of the telegraph, who have been accustomed to greet each other over the wires at long range, to meet personally. The Cleveland reunion this year should, therefore, be a "73" peace gathering, and it no doubt will be well attended.

If anyone has any old time relics that ought to be placed in the archives of the Old Timers' Association, address John B. Taltavall, secretary, 253 Broadway, New York, who will be very glad to give the necessary information regarding their disposition.

Those who are eligible to membership in the association are invited to send in their requests for application blanks to the secretary. Initiation fee is $1.00 and annual dues $1.00.

### Communication With Russia Via Sweden.

A report from Sweden states that the Tingstaede radio station on the Swedish island Gotland is soon to be opened to the public for the transmission of private and business telegrams to points in Siberia and European Russia. The Gotland station will work with stations at Ekaterinburg, Perm, Tchelyabinsk, and Zlatoust.

## THE CABLE.

### John L. Merrill, President of "All America Cables," Banqueted by Officers and Department Heads.

The officers and heads of departments of the All-America Cables gave a dinner to their president, John L. Merrill, at the Algonquin Hotel, February 28, on the occasion of his thirty-fifth anniversary of entering the company's service.

Vice-President James R. Beard, acted as toastmaster, and after reading numerous cablegrams of congratulations from Mexico, Central and South America, said business topics would be tabooed, that the purpose of the gathering of the representative workers of the All America Cables was to extend greetings to one who had so assiduously not only devoted his energies to the success of the company but also to the interest of those who during the past strenuous times had aided him in his work. Mr. Beard added in his well-known amiable manner that he had no doubt been selected as toastmaster on account of his being the youngest worker and that it was with unalloyed pleasure that on behalf of the employees that he extended to Mr. Merrill congratulations on the completion of thirty-five years of service and as a token of their regard and esteem he was requested to present the small case containing a set of studs which he hoped would always be a happy reminder of the pleasant relations existing between Mr. Merrill and his fellow workers, and that he knew he voiced the sentiment of all when he wished him many years of activity and trusted all would be spared to extend similar felicitations on his fiftieth anniversary.

Mr. Merrill in responding said the gathering was such a surprise to him that he could not find adequate words to express his appreciation of the sentiment which prompted it. He paid high compliment to the hearty cooperation of every one in making his administration a success and particularly emphasized his desire that the relationship of himself and all other co-workers should be as personal and friendly as it was possible to make them and that friendship and team work were great factors in success.

Vice-President A. Davidson's remarks and delightful stories made those present vie with each other in making the evening one long to be remembered.

Assistant Treasurer F. K. Warren in reminiscence of the days when the company's headquarters were in 37 Wall Street, told a number of very interesting stories of Mr. Merrill's early career.

Others followed with short witty talks and all regretted when father time ended a very enjoyable evening. Among those present were Messrs. J. R. Beard, A. Davidson, W. H. Coade, J. G. Murray, F. W. Phelan, R. Tyers, J. J. Shirley, W. A. Eagan, W. A. Towner, W. Hannah, G. L. Jost, H. De la Montagne, J. J. Halpin, F. A. Pirie, F. K. Warren and B. H. Reynolds.

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## CANADIAN NOTES.

THE TELEPHONE DEPARTMENT of the Province of Alberta for the year 1918 shows a surplus of $205,738, the receipts being $1,377,425 and the expenditures $1,171,687.

FRANK L. WARD, telegrapher in the service of the Canadian Pacific Railway at Irvine, Alberta, is the author of a popular song entitled, "I Love to Visit Home to See My Mother."

### Morkrum Printer Circuits on the Canadian Pacific Railway Company's Telegraph Lines.

The rapid extension of the Morkrum Printing Telegraph System for both railroad and commercial telegraph operation on the lines of the Canadian Pacific Railway Company's Telegraph, throughout Canada, is evidenced by the following list of circuits now in operation:

Halifax to Montreal, with repeater at St. John, 756 miles; Montreal to Ottawa, 112 miles; two circuits Montreal to Toronto, 338 miles; Ottawa to Toronto, 260 miles; Montreal to Winnipeg, 1,412 miles, with repeaters at Sudbury and Fort William; Toronto to Winnipeg, 1,233 miles, with repeaters at Sudbury and Fort William; Winnipeg to Regina, 357 miles; Winnipeg to Moose Jaw, 398 miles; Regina to Moose Jaw, 41 miles; Moose Jaw to Saskatoon, 211 miles; Winnipeg to Calgary, with repeater at Moose Jaw, 832 miles; Moose Jaw to Calgary, 434 miles; Calgary to Edmonton, 194 miles; Winnipeg to Vancouver, 1,474 miles, with repeaters at Moose Jaw and Calgary; Calgary to Vancouver, 642 miles.

Manager of Telegraphs J. McMillan states that, in addition to the foregoing, two additional circuits will be equipped with Morkrum apparatus as soon as the manufacturers can deliver the necessary machinery.

### The Cable Ship "Restorer."

The cable ship *Restorer,* now engaged in keeping in repair the cables of the Commercial Pacific Cable Company, was launched in 1902 at Newcastle on the Tyne for the Eastern Extension Telegraph Company's service in oriental waters. Two years later she was purchased by the Commercial Pacific Cable Company, New York, and Captain B. C. Coombe who is still in command of the ship was sent from London to Singapore to take over the vessel and take her to the Pacific coast. The *Restorer* was granted American registry at the outbreak of the European war and in 1914 was sent from a British Columbia port to Puget Sound.

The Commercial Pacific Cable Company owns 10,000 miles of submarine cable extending from San Francisco to Honolulu, Midway Islands, Guam, Manila and Shanghai.

On March 12, the company reported the cable between Honolulu and Midway as having been repaired and submarine service restored with the Philippines, China and Japan via San Francisco.

## RADIO TELEGRAPHY.

### Marconi Notes.

E. J. NALLY, vice-president and general manager, who recently returned from Europe, entertained the head office staff to the number of eighty at a buffet luncheon in the general offices shortly after his return. He gave a most interesting talk, lasting an hour, covering conditions as he saw them in England, France and Belgium. Being a keen observer and deep thinker, his first-hand observations were most interesting to those present.

E. J. NALLY, vice-president and general manager, accompanied by Chief Engineer R. A. Weagant, has returned from a business trip to Washington.

THE following resignations have occurred in the auditing department: Mrs. T. Boyd and the Misses G. Reynolds, A. M. Bassett, and M. R. Ewing.

MESSRS. E. B. PILLSBURY and W. A. WINTERBOTTOM visited the high power stations at Belmar, N. J., and Chatham, Mass., which have been released by the navy.

W. A. WINTERBOTTOM, traffic manager, has returned from a business trip to Ohio.

A complimentary dinner was given to E. J. NALLY, vice-president and general manager, by twenty-six members of his staff, on his return from Europe. The dinner, which was served at the Fifth Avenue Restaurant, was a most enjoyable function, enlivened by a number of speeches, the principal one being by Mr. Nally. He detailed his unusual experiences due to strike and war conditions, and vividly described what he saw of the devastated districts.

G. E. HENDERSON has been relieved from duty as superintendent of the Gulf Division, New Orleans, and Paul C. Ringgold is now acting superintendent.

WILLIAM H. BARSBY, chief electrician radio, has been released from the navy and resumed his former duties in high power service at New York.

### Annual Report for 1918 of the Marconi Wireless Telegraph Company of America.

The report of the directors for the year 1918 shows that the operations of the company yielded a net income of $998,358.14 as compared with $780,592.44 for the year 1917. After deducting $286,516.37 for reserves the net income for the year 1918 showed a gain of 15.23 per cent over the income for 1917. The surplus on December 31, 1918, amounted to $1,631,415.78, the reserves set aside at that date for depreciation amount to $629,176.27 additional. The 1918 dividened payment amounted to $499,975.00.

THE POSTMASTER GENERAL of Great Britain has asked the treasury department for forty million dollars to be used this year in constructing new telegraph lines, telephone lines and exchanges.

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## PROGRESS OF GOVERNMENT CONTROL OF TELEGRAPHS.

On March 22, Postmaster General Burleson issued the following order:

"WHEREAS, The president of the Mackay Companies, Clarence H. Mackay; its general counsel, W. W. Cook, and its secretary, William J. Deegan, have failed to carry out the orders and instructions of the Postmaster General and have conducted themselves before the public and with the operating force of said system in such manner as to materially and disadvantageously affect the interests of the government and the operation of this and other telegraph and telephone systems under government control;

"*Now, therefore, it is ordered:* That Clarence H. Mackay, president; W. W. Cook, general counsel; William J. Deegan, secretary, and the board of trustees or directors, and the owners, are relieved of any and all duties appertaining or incident to the supervision, possession, control, and operation of said telegraph and telephone system, the supervision, possession, control, and operation of which was so assumed by the President in his proclamation of the 22d day of July, 1918; and I hereby substitute A. F. Adams for said Clarence H. Mackay, and said owners and said board of trustees or directors in the management of said system, and direct said A. F. Adams to take possession for me of all records, books, and papers, made and used in the operation of said system since midnight of July 31, 1918, and also the net balance or balances of the funds derived from the operation thereof since midnight of July 31, 1918; all officers and employees of the said telegraph and telephone system, except as and in the capacity in which hereinbefore relieved therefrom, will continue in the performance of their present duties, reporting to their respective superior officers and on the same terms of employment as heretofore, the purpose being with respect to this system, as with respect to all other telegraph and telephone systems under government control, so to operate said system as to maintain its integrity and value as a going concern, the efficiency of the organization, and of adequate service to the public."

### PRESIDENT MACKAY ISSUES STATEMENT.

In response to the action of the Postmaster General, President Clarence H. Mackay, on March 24 issued the following statement:

"On my return to New York after absence over the week-end I learned the facts in regard to the call last Saturday of Postmaster General Burleson's representatives at the executive offices of the Postal Telegraph-Cable Company, of which I am still president. It appears that on Saturday noon, just at the close of business hours, and after I had left town on a visit to my daughter in Baltimore, without previous notification of any kind, Mr. Bethell, of the Bell Telephone Company; Mr. Bracelen, an attorney of the Bell Telephone Company, and Mr. Adams, of the Kansas City Telephone Company, called.

"I leave it to the judgment and fair play of the American public as to what it thinks of the company's competitors being given power by the Postmaster General to call at our office and demand control of our property in the absence of the president of that company, and without the slightest intimation of their intended visit. It would seem incredible if it had not actually occurred, and is the latest and greatest example of government by bureaucrats.

"Mr. Burleson tries to justify his action by saying we did not obey his instructions," continued Mr. Mackay. "I know of only two matters which could possibly be distorted into justifying Mr. Burleson's assertion. One is the question of the wage schedules, which the ambiguity of the announcement by the Post Office Department caused much delay in applying to our system and which delay was understood by Mr. Bethell, Mr. Burleson's representative."

Mr. Mackay said Mr. Bethell had told him that, as the Postal system of organization was different from the Western Union, to go ahead and do the best he could in this matter, which he did by announcing a 10 per cent. increase, dating from January 1.

The other question, he said, was the matter of increasing the telephone rates. This brought them into direct conflict with public utility commissions in various states, and they were unable to accede to the order until first making sure where the company stood legally in the states affected.

"We have endeavored to maintain our usual high class telegraph service under the most difficult circumstances, due to the deterioration of the morale under Mr. Burleson's control," Mr. Mackay continued, "and if any evidence is needed of this, it is only a fortnight ago that we sent out our chief operating manager on a tour of inspection, with orders to speed up the service as much as possible.

"The lines were turned over to Mr. Burleson for 'the national security or defence,' and purely as a war measure. The principal acts of Mr. Burleson since he took control have been the increasing of long distance telephone rates in the interest of the Bell Telephone Company, the proposition to increase telegraph rates in the interest of the Western Union Telegraph Company, the seizure of the cables after the signing of the armistice, the ousting of myself and other officials from the Commercial Cable and Postal Telegraph-Cable companies, and the order that the Postal company should build no lines to compete with the Bell Telephone and Western Union without first submitting our plans to officials of those companies.

"However, I wish to serve public notice on Postmaster General Burleson that for those things which are un-American, for the taking advantage of the public under pretense of a war measure, for his turning over the operation of our properties to our competitors, and for his despotic and brutal methods, I will fight him to my last dollar and to the last ditch."

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## PLACING OF HOUSE CABLES IN LARGE BUILDINGS IN NEW YORK CITY.

BY O. J. DORWIN.

Suppose it were possible to take a sort of Roentgen ray photograph of the sky line of New York, in which all the buildings were perfectly transparent and only the vertical telephone cables, terminals, wires, and instruments were opaque. The result would be a veritable forest of slender, straight, tree-like structures rising to a height of 600 feet at some places, and all having slender horizontal branches with terminal boxes on the ends and from these latter a network of wires extending vertically or horizontally to the tens of thousands of telephone instruments. This, then, is a portion of the nervous system of your Father Knickerbocker, the finger-tip ends, as it were, of a very complex system with many parallel and crosswise spinal cords in the duct subways in the streets.

This forest of house cables, as these vertical cables are called, would be densest in the down-town financial district and in the midtown hotel and office building district and would thin out in the uptown sections, until only an occasional small riser would be noted on Washington Heights. In the business districts every building of importance has at least one such house cable and the large down-town office buildings several. The Equitable Building has ten 600-pair risers and the new American Express Building has eight of the same size. These cables range from 100 to 900 pairs at the lower ends and diminish in size toward the top.

It is only the placing of these heavy house cables which concerns us in the present article and a glance backward for ten or fifteen years will serve to trace the development up to the present.

Of course the earlier house cables were small and intended mostly for buildings of but few stories and these, after being spliced up to fit the buildings, were clamped to outside walls or secured in elevator shafts with toggle wire ties which supported the weight of the cables. As building heights increased house cable sizes and weights also increased until it became necessary to attach the cables to support wires, and now for very heavy cables the lower half is attached to and supported by one seven-wire support strand and the upper half by another.

Originally the house cable was made up and spliced on the roof of the building. Then the cable was lowered slowly and laboriously down the elevator shaft (sometimes a pipe shaft), being lashed temporarily with spun yarn ties to a heavy manila rope, which was intended only to sustain the weight. After being lowered into position, it was transferred from the manila rope to a 7-strand, 6,500-pound, No. 12 BWG support wire, which had been stretched taut in the corner of the shaft and attached at the top to an "I" beam or other substantial part of the building frame and at the bottom through a turnbuckle to a similar anchorage. By this method it took, usually, most of the day to get the cable lowered and a gang of eight or ten men, mostly ex-sailors, were required.

Then followed the slow process of transferring the cable to the span wire and the taking out of the floor branches. This took another one to two days according to the size of the cable.

Next, the method of tying support wire to the house cable on the roof, before lowering, was adopted. After that came the method of splicing all house cables in a suitably equipped shop, which is the present practice. From the shop the cables are transported in coils or on reels to the building, where they are hoisted by elevators to the top floors, laid out, and the span wires tied on. After this, they are lowered in much the same manner as described above.

As the cables increased in weight, it became necessary to take them up only half way in the building, from which point the upper portion was hoisted with block and tackle and the bottom part lowered.

We now have an electric cable hoisting machine designed for this work. By means of this machine the house cable is hoisted from the basement, ground, or second floor to its position in the shaft.

The cable is first laid out on one of the lower floors and secured to the support wire. This is done by spreading the strands of the support wire and inserting pieces of No. 18 galvanized iron tie wire at distances of from 3 to 4 feet apart, the shorter spacing being for heavy cables. These tie wires, which are from 3 to 12 feet long, are then wrapped tightly around the cable and support wire, the ends twisted and bent over.

In the meantime, the machine is taken to the top floor, set in position and connected with the temporary lighting and power circuits in the building. A steel or manila rope is then dropped down the shaft and secured by means of a special hook and two or three guy clamps to a point about twenty feet from the upper end of the support strand. A signal gong is rigged up by means of a light line down the shaft and when all is ready the hoisting starts. Short pieces of pipe, for use as rollers, are placed under the cable laid out on the floor so that four men can easily pull it along towards the shaft as the machine takes it up. A heavy twenty-story house cable can be raised by this means in about thirty minutes, using a gang of six men, and it is possible to complete the work of tying in and taking out the floor taps in a little over a day.

One advantage of this method is the small amount of straightening out, which the cable requires after being hoisted, and the consequent freedom from cable breaks.

Again the use of power makes light work of an otherwise laborious job. The men after placing a 2,000-pound cable in a shaft have little cause to feel the fatigue which was once an unavoidable result of such undertakings. Of course, it is still necessary to do some work in connection with placing these cables, but perhaps if we could shoot high tension alternating current into the tail of one of them, it might wiggle up the shaft by itself.

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# The Dixon Ocean Cable Amplifier.

## Improvement in Submarine Signaling Which Greatly Increases Number of Words Per Minute Transmitted.

The Dixon Amplifier (or Magnifier), the invention of Thomas B. Dixon, which has been patented in the United States and foreign countries, has been in practical operation on one or more of the Atlantic cables for several years, in some cases having been employed to operate the siphon recorder directly and in others to operate a cable relay, repeating into a second cable. This amplifier, with its accessory features, is of peculiar interest because of two highly important facts, 1, speed capacity; 2, ability to work successfully under adverse conditions against disturbances, etc., with a minimum of interruptions and time loss, and general reliability.

In speed capacity, it has broken all trans-Atlantic records, so far as known, having handled all classes of actual traffic on a cable having a normal recorder speed of one hundred and ninety letters per minute at speeds as high as from four hundred and thirty to four hundred and fifty letters per minute, a net speed gain of over one hundred and twenty-five per cent, working in single direction on duplex connections. A sample of actual received tape at a speed of four hundred and thirty letters per minute is shown in Figure 1. It has handled actual traffic, working duplex, on a cable having a normal recorder speed of one hundred and ninety letters per minute at a speed as high as three hundred and thirty-eight letters per minute, a net speed gain, duplex, of seventy-eight per cent.

In experimental single direction working on duplex connections on a cable having a normal speed capacity of one hundred and ninety letters per minute signals good enough for ordinary traffic were demonstrated at a speed of four hundred and ninety-one letters per minute, a net speed gain of one hundred and fifty-eight per cent, a sample of the received slip at this speed being shown in Figure. 2. Figure 3 shows a sample of tape of signals obtained at a speed of six hundred and thirty-six letters per minute, on a trans-Atlantic cable with duplex connections and working in a single direction. The net speed gain at six hundred and thirty-six letters per minute as compared with the normal speed of the cable of one hundred and ninety letters per minute amounts to two hundred and thirty-four per cent.

It is to be noted that the signals shown in Figure 3 are not claimed to be commercial signals, and are interesting only from the standpoint of being a demonstration of speed possibilities scarcely even dreamed of theretofore by even the boldest prophets in the field of cable operation. They are very interesting indeed from this standpoint, since cable men know well that the speed limit of a cable is always reached when the "reversals", i. e., signals having elements of positive and negative polarity succeeding each other, fail to get through, the positive element tending, as the speed increases, to obliterate the negative element, and vice versa. It will be seen that in this sample the reversals got through in fine shape, and Mr. Dixon states that it is his belief, and the expressed belief of expert cable men witnessing the experiments, that establishing practical trans-Atlantic cable working at speeds exceeding six hundred letters per minute is merely a matter of elimination of disturbance and adjustment of apparatus and the provision of magnetic shunts of proper values, the magnetic shunts employed by him hitherto being of standard construction designed for ordinary recorder working, and not having been specially designed as should be the case, for his apparatus.

The reliability of the Dixon amplifier, its capacity to work steadily under varying conditions with a minimum loss of time for adjustments, has been demonstrated in many ways and at many times, and

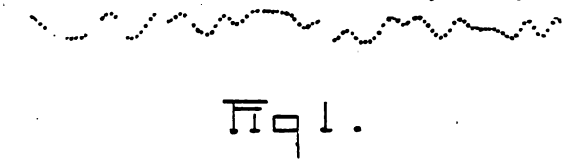

Fig 1.

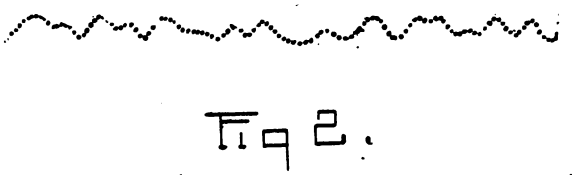

Fig 2.

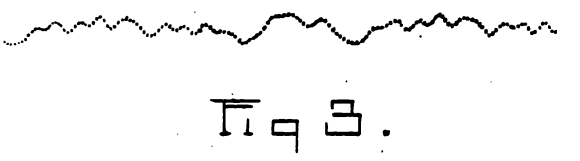

Fig 3.

it may be particularly mentioned here that on several occasions when earth-current disturbances made impossible the working of other cables terminating in the same office as the cable equipped with the Dixon apparatus the latter worked steadily and reliably.

Referring now to the apparatus of the amplifier this consists as at present installed of the amplifier proper and accessory means for eliminating effects of disturbances, caused by imperfect balance in duplex operation and by other disturbances in the cable circuit.

In the Dixon amplifier selenium cells influenced in their electrical conductivity by light variations

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controlled by the cable signaling currents are utilized to effect the amplification of received signals on a secondary receiving instrument placed locally in the selenium circuit; and an arrangement of condensers and inductances shunting the main and local receiving instruments are employed to reduce to a minimum the effects of disturbances, this arrangement also serving the purpose of greatly assisting in readily adjusting the apparatus so as to give the received signals proper shape and render them easily legible to the operator.

A selenium cell is illustrated in Figure 4. It consists, as usually constructed, of two parallel wires, preferably platinum, wound close together but so as

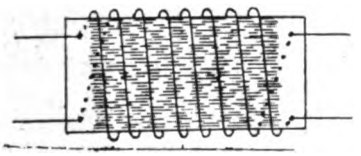

Fig 4.

not to touch each other, in a single layer over a flat base of some non-conducing material such as steatite, and coated over with a thin film of selenium, which is first melted and spread as evenly as possible over the surface and then subjected to an annealing process, after which the cell is ready for use. The electrical current enters one wire, passes through the selenium coating to the other wire, the two wires being connected to the battery terminals. Such a cell may have an electrical resistance which

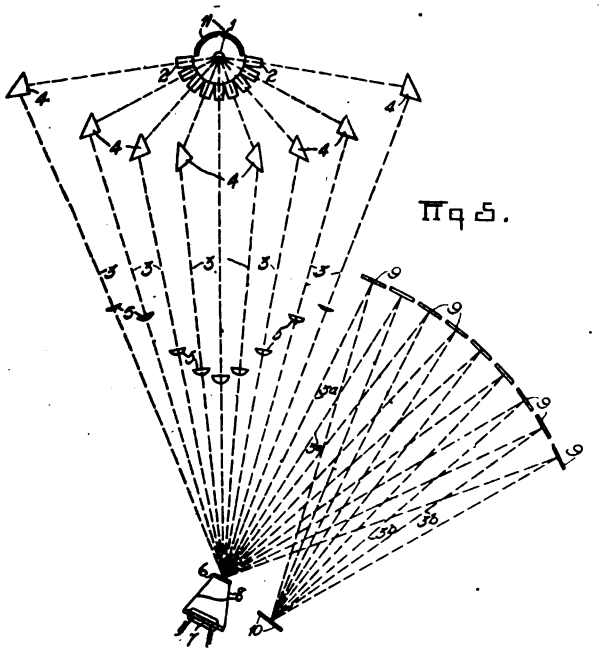

Fig 5.

in the dark is many times as great as when exposed to light, the reduction in resistance due to illumination being in general proportional, within certain limits, to the intensity of the illumination. Selenium cells, according to the process of manufacture, may be so constructed that their resistances vary quickly or slowly under a given variation in illumination, a quality which is most desirable from the standpoint of a universally applicable cable amplifier, since by selecting cells that are not too quick acting and properly adjusting the light intensity it becomes possible to work cables affected by bad balance or other disturbance conditions much more readily that where the quicker acting cells are employed.

The general arrangement for the light control usually employed in the Dixon amplifier is shown in Figure 5. The source of light 1 is preferably a nitrogen filled tungsten lamp having a single straight filament suspended vertically, around which are placed segmental condensing lenses 2 which serve to divide the light into a number of separate light pencils 3 (the axes of the pencils only being indicated), narrow and rectangular in cross-section, which (excepting the central pencil which does not require a prism) are concentrated by means of prisms 4 and focusing lenses 5 upon the thin, rectangular galvanometer mirror 6 which is suspended by fine phosphor-bronze wire so as to be rotatable about its axis within certain limits by the movements of a coil of wire 7 to which it is connected by quartz fibres 8. The coil, also suspended by fine phosphor-bronze wire, is placed in a magnetic field (not shown), and through its windings the cable circuit

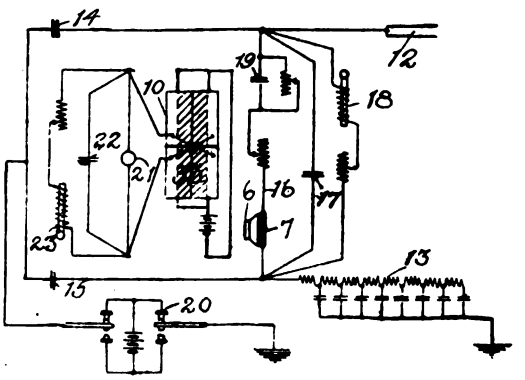


Fig 6.

passes, the mirror thus being made to follow, owing to the pull of the quartz fibres, the movements of the coil in response to signals. The light pencils, 3a, reflected from the mirror 6, first impinge upon strip reflectors 9 and are thence reflected at proper angles as pencils 3b to coincide in position on the selenium cells 10, so that as the mirror 6 turns to right or left on its axis the light pencils, coinciding in position on the cells, move correspondingly across the surface of the cells, the usual arrangement being such that each cell is, when the light pencils are in the central or zero position, half illuminated and half in the dark (except as it may be slightly affected by stray light). Concave reflectors 11, placed at the rear of the light source, add considerably to the light intensity of each of the pencils. Four cells or groups of cells are usually employed, being mounted in a moisture proof case having a glass front and connected

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together so as to form the four arms of a Wheatstone bridge and in such manner in relation to the light that a movement of the light in either direction influences the cells through varying the areas of their illumination in all four arms of the bridge simultaneously and so as to cause a flow of current of similar direction in the cross-wire, in which is placed the local (secondary) receiving instrument. The light pencils at the point of impingement on the selenium cells are made of substantially the same shape and size, all being much higher than wide and rectangular in cross-section, by making the condensing lenses 2 higher than wide and by providing lenses 6 of different focus, since the light pencils have different total lengths from the source of light to the selenium cells, and if the lenses 6 were all of the same focus the cross-section of the longer light pencils at the point of impingement on the selenium cells would be greater than that of the shorter pencils, a condition not desired.

The importance of employing a plurality of light pencils in lieu of employing a single light pencil in apparatus of this type will be apparent when it is stated that while the illumination obtainable from a single light pencil is sufficient for results up to a certain point, the efficiency is enormously increased where a plurality of light pencils concentrated on the cells as above described and moving in unison across the surface of the cells is employed. This is true because with the plurality of pencils the illumination factor may be readily adjusted to meet any condition found in practice; and the electrical energy varied in the local circuit, and hence the amplification, is directly proportional to the surface of the selenium varied and the intensity of illumination; two pencils, in general, exerting double the illuminating power of a single pencil, and so on. Also, the more intense the illumination, the sharper and better defined the signals at high speeds. The sample of slip shown in Figure 3 was obtained with an arrangement of apparatus comprising forty-five light pencils, each pencil having a length of approximately fifteen feet between the mirror 6 and the selenium cells, while that in Figures 1 and 2 was obtained with an arrangement of apparatus having twenty-eight light pencils, the length of each moving pencil being approximately eleven feet. Naturally, with a given movement of mirror 6, the longer the light pencil, the greater the movement of the light at the point of impingement upon the selenium cells, and consequently, the greater the variation in resistance (assuming the same light intensity at the cells for an agreement of long pencils as for one of short pencils) of the cells, and resulting signaling amplification, which means corresponding speed capacity.

Consequently, the thinner the condensing lenses 2, the greater the number as well as the length of pencils obtainable with a given radial distance between the source of light and the lenses. In the figure, for sake of simplicity of illustration, the half-circle filled with the condensing lenses is divided into only nine lens sections whereas in practice it is usually divided so as to comprise from forty to sixty segmental condensing lenses.

In certain arrangements of the Dixon apparatus not yet, however, actually put into practical operation, the mirror 6 is made with a double reflecting surface, so that without adding to the weight and inertia of the mirror double the amount of light can be controlled, with consequent doubling of amplification obtainable with a single reflecting surface mirror.

In Figure 6 is shown the well-known Wheatstone bridge arrangement of receiving circuits and instruments at one end of a cable circuit with the local selenium cell arrangement added; 12 being the incoming cable end, 13 the artificial line, 14 and 15 block condensers, commonly provided in the main line and artificial line, 16 the cross-wire of the bridge wherein the main coil 7 of the receiving apparatus is located, and 17 capacity shunted around coil 7 and 18 inductive resistance also shunted around coil 7; also is shown the usual receiving shunted condenser 19 in the cross-wire 16 of the bridge. Suitable regulatable non-inductive resistances are provided, as is customary. The usual transmitting apparatus 20 connected to the apex of the bridge is also shown. Selenium cells 10 are shown arranged to be actuated by light pencils projected upon them by the reflector 6 actuated by the coil 7, and 21 designates the local receiving instrument operated by the selenium cells circuits. The shaded area 3b indicates the cross-section of the light pencils, and assuming the normal resistance of the four cells forming the arms of the Wheatstone bridge to be equal, with the light in the normal, which is the central or zero, position, each cell having half its surface area illuminated as shown in the figure, no current flows through the secondary receiving instrument 21 but will flow through this instrument in the one direction or the other making dot or dash signals, according as the light pencils are deflected to the one or the other side of zero. A capacity 22 is shunted around this local receiving instrument 21, also inductive resistance 23 likewise shunted around this receiving instrument. By giving proper values to the capacity 22 and to the inductive resistance 23 a much higher value can be given to the capacity 17 than would be practicable with that capacity used alone, and the result following the employment of the two capacities and inductances, one set shunting the main receiving instrument and the other set shunting the secondary receiving instrument, is that under certain bad disturbance conditions without the capacity 22 and inductive resistance 23 the signals would be unreadable even at quite low speeds, yet with the shunted capacity 22 and inductive resistance 23, together with a condenser 17 of the higher capacity, perfect signals may be produced; in fact, the effects of the disturbances mentioned are for all practical purposes, eliminated.

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The old wire chief says: "When a lineman in your district sends you in a barrel of apples from his own trees you may take it for a fact that you are a good fellow—or he is."

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## A FEW COMMENTS ON PRINTING TELEGRAPHS AND MORSE.

BY J. F. SKIRROW.

The subjoined comments are compiled from various reports made during the past few years and may be of general interest at this time.

There is no printing telegraph so far devised, nor is there likely to be, the operation of which is substantially independent of line conditions, where the conditions consist of open pole line subject to atmospheric changes.

The printing telegraph advocate invariably insists that the operation of a "printer" can be undertaken offhand by anyone who can finger a keyboard. This ignores the fact that the ability of a telegraph operator consists very largely of capacity to read copy accurately and the use of good judgment based on telegraph office experience in the transmission of copy.

The use of printing telegraphs has demonstrated beyond question that mere ability to operate a typewriter does not constitute the makings of a good operator for a printing telegraph, and also that the nature of printing telegraph employment offers little or no attraction to graduates from typewriting schools. There have been many instances where graduates from such schools either declined to even try the work when they saw the machines, or resigned after a day's service.

Long experience in training young people to become both Morse and printer operators, has shown that it takes between eighteen months and two years to produce a good operator of either kind and that at any period after the first three months the Morse beginner is apt to be more useful than the printer beginner.

Telegraph printers even in their simplest form will probably always be more or less complicated mechanisms with many electrical contacts, and electro-mechanical skill will therefore always be required to keep them in order. Contact points have to be kept clean and readjusted as they wear, and there must be intelligence back of these adjustments. This militates against the use of such apparatus in small isolated stations.

Trained printer mechanicians are essential to the operation of printers.

It takes about a year's time to develop a fairly bright young man with mechanical and electrical ideas into a good printer mechanician.

An engineer is of little value in getting and keeping a printer going unless he has had considerable and recent experience as a printer attendant. This means that you cannot operate printers on call by hiring typewriter operators and assigning engineers to the circuits to make them run. It takes months to train both operators and attendants to obtain efficient operation.

Duplex keyboard printers offer few if any advantages over the use of Morse. The operating costs including the rentals or the upkeep and the interest on the investment run so close to that of Morse that the saving (if any) is about offset by the poorer work of the printers and their lack of flexibility and interchangeability with Morse circuits. The maintenance of separate staffs for Morse and printers makes for complication and extra expense. An all-Morse staff is much more flexible.

Where there is need for moving a greater volume of business over existing wires it may pay to utilize high capacity tape or multiplex printers, if they can be obtained at a rental (or interest on outlay and upkeep) that will give a substantial saving over the interest on the cost of additional wires.

Morse is essentially a language. A Morse operator receives by ear and transmits by hand. He hears his own transmission and thus has a perfect check upon the accuracy of his work. With the use of the Vibroplex or wigwag key high speed manual Morse transmission is not arduous, and with a typewriter for the reception of messages (the speed capacity of which is greatly in excess of that of Morse hand transmission) a good receiving operator is not hard pushed at any time. Barring bad wire conditions a good Morse operator's work is performed without undue strain. It is true that he must keep his mind closely on his work but he becomes more and more proficient as the years go by and transmits and copies with greater ease and almost unfailing accuracy. There are many instances of operators over seventy years of age who handle a heavy volume of business daily with accuracy and ease.

The Morse operator feels confident in his work because he hears the signals follow his hand and knows that they are correct, just as a person speaking hears the sounds he produces. In addition he knows that the operator receiving from him will check him instantly if a transmitted signal does not reach its destination intelligibly and that errors are therefore not apt to occur if he does his part of the work properly. Most Morse telegraph operators enjoy their work and because of this are apt to stay at it for their life time if working conditions are reasonably satisfactory to them.

Keyboard telegraph operators work under greater stress than do Morse operators. The only way in which they can check the accuracy of their transmission is to constantly watch the home typewritten record of the matter they are sending, and this check unlike Morse is not instantaneous. It also divides the attention of the operator between the keyboard, the copy of the message transmitted from, and the copy of the home record of the signals. There is no assistance from the distant operator to check the sender if a wrong key is struck, unless the attendant at the distant station should question the accuracy of the copy. The machine often takes no cognizance of line disturbances except to print a wrong letter. The mechanical noises of the printer have no direct relation to the signals transmitted and therefore constitute disturbing noises to the operator instead of the sound of his "voice." This means that the printer operator does not work with the same confidence as the Morse operator. Printer operators seldom have the spirit in their work that Morse operators have, because increased keyboard speed means increased stress without the satisfaction

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the Morse operator has of team work with the operator at the other end of the circuit. As an illustration of this spirit the best Morse operators take pride in the fact that they can transmit for hours or a full day without once checking or questioning the sender. Keyboard operators are pounding away at a non-intelligent machine, and the work becomes irksome.

The mechanisms and electrical connections of Morse circuits are relatively very simple and require comparatively little electrical and less mechanical knowledge in their practical handling at the instruments.

The mechanisms and connections of printing telegraphs are complex to the last degree and require a high degree of electrical knowledge and mechanical skill at the apparatus to keep them going.

Morse apparatus calls for the minimum of skilled attention. Printers require the maximum.

Any wire that can be used to transmit signals can be employed for Morse, and even when it is in trouble can often be utilized to move some business. Printers must have practically perfect circuits if any business is to be moved on them.

In practice the wire chief invariably gives the printer the best he has to save himself trouble.

Apart from the use of high speed transmitting printer systems and multichannel printers utilized to avoid putting up additional wires it is the opinion of the writer that the Morse system will continue to be the principal reliable and economical standby for many years to come.

## The O-O Column.

The telegram which read "Send us three dozen skinned cats by first express" might have been startling had not the receiver been working the Boston fish wire in a Fulton Market office.

The railroad telegram which read "Twenty-two and one-half negroes for No. 64 at Haven Junction" was quite intelligible to the conductor of No. 64, for he knew it meant twenty-two full-fare and one half-fare tickets providing passage for negroes connecting with a main line train.

"Will pay your bill if full tomorrow" was explained as a miscue on the part of the receiving operator striking an "f" instead of an "n."

When the boy ran up to the Boss and said "New Orleans is busted" it is a good thing the boy was a check clerk and the Boss a chief operator.

After everything else they could think of had been done to get the quad going four-cornered, the latest recruit in the machinery department suggested that they reverse the condensers.

"Pip" may be the Phillips' code abbreviation for Philippines in the rest of the world but it is said that on a southern press circuit it means "posse in pursuit."

## W. J. Durand, District Commercial Superintendent, Kansas City, Mo.

W. J. Durand, recently appointed district commercial superintendent of the Western Union Telegraph Company at Kansas City, Mo., to succeed C. W. Mitchell, deceased, entered the service of the Wisconsin Telephone Company, in the toll line construction department in the year 1886, and later was employed as inspector for the Southern Bell Telephone Company at Birmingham, Ala., remaining there until 1891. After a few years in other lines of activity Mr. Durand on April 1, 1898, entered the service of the Western Union Telegraph Company as operator at St. Paul, Minn. Here he studied the electrical side of the business and in 1901 was sent to Watertown, S. D., to install quadruplex and repeater equipment, remaining in that office as operator and later as manager until 1908. In that year he was transferred to Minneapolis as manager of the important office in the Chamber of Commerce, and in the fall of 1910 was advanced to the position of district commerical agent at Minneapolis where he remained until his appointment in May, 1918, as division commercial agent at Omaha, Neb., in the new Central Division.

W. J. DURAND.

Mr. Durand's recent advancement to the superintendency at Kansas City brings to that office a man of long experience and training, and who is highly regarded by his associates and by employees serving under his direction.

## The Telegraph in Colombia.

In the little republic of Colombia, although the distances between towns are comparatively short, and the telephone is used, the telegraph business shows a steady increase in volume. In the past eight years the number of telegrams per month has about doubled in number. At the present time the business amounts to about 100,000 messages per month.

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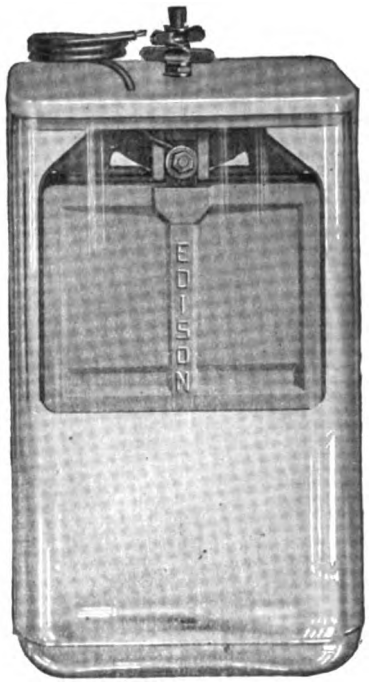
# FOR CLEAR TRANSMISSION

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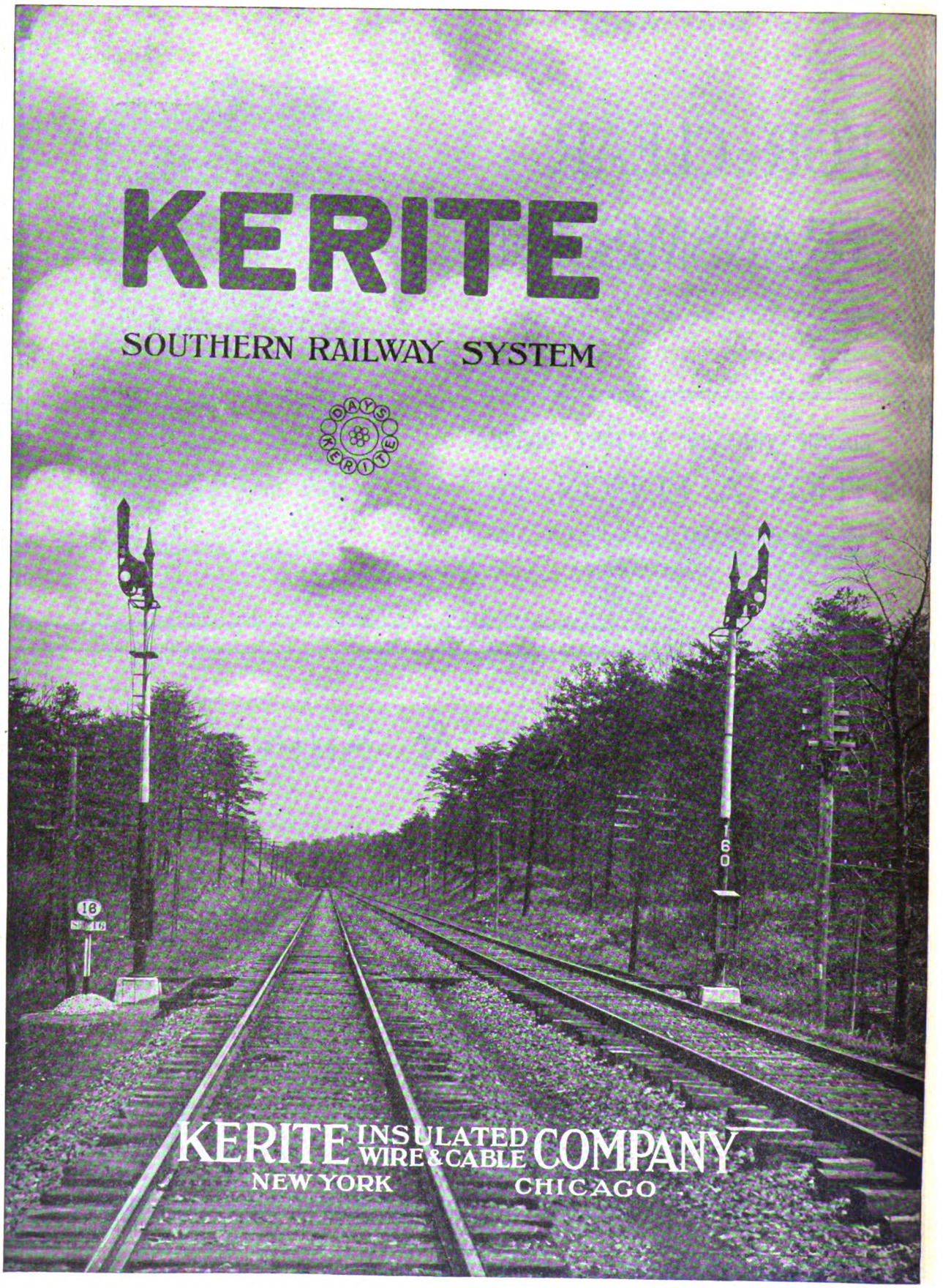


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## THE RAILROAD.

H. A LOGUE, superintendent of telegraph and signal engineer of the Cumberland Valley Railroad, Harrisburg, Pa., was a recent New York business visitor.

V. T. KISSINGER, who recently retired on account of ill health, as superintendent of telegraph of the Burlington System, Chicago, Ill., died suddenly of heart failure on March 12, at Siloam Springs, Ark., which place he intended to make his permanent home.

### Association of Railway Telegraph Superintendents.

A circular issued March 17 from the office of W. L. Connelly, secretary of the Association of Railway Telegraph Superintendents, and addressed to all members, reads as follows:

"On January 10 the Director General of Railroads issued Circular No. 70, stating that the scope of the American Railway Association had been enlarged, its name changed to the American Railroad Association, and that it would cover, during the period of Federal control of the railroads, the former activities of our association.

"In view of this circular, a meeting of the executive committee of our association was held in Washington on January 30. After discussing the amalgamation, it was thought that our organization should be maintained intact, but should remain inactive during the period of Federal control, and as soon as our work shall have been taken over by the American Railroad Association, a statement should be sent to our membership.

"I therefore desire to advise you that the Teleraph and Telephone Division of Section No. 1—Operating of the American Railroad Association has been organized and that the committee of direction of this division held a meeting on February 20 in New York, at which time arrangements were made to take over and handle the former activities of our association in accordance with the circular of the Director General.

"Your executive committee now thinks that further action relative to our association should be deferred until the first annual meeting of the Telegraph and Telephone Division of the American Railroad Association, to be held in Chicago on June 11, 12 and 13, at which time a brief meeting of our association will be held for the purpose of amending the constitution to meet the conditions. Meanwhile a committee has been appointed to draft suitable amendments to the constitution which will be submitted to the membership thirty days in advance of the meeting."

JAMES RANDOLPH, telegraph and telephone lineman and maintainer in the service of the Chicago, Milwaukee and St. Paul Railway at Avery, Idaho, writes that the educational matter contained in the successive issues of TELEGRAPH AND TELEPHONE AGE has helped him wonderfully in his daily tasks.

## MUNICIPAL.

### International Association of Municipal Electricians.

The executive committee of the International Association of Municipal Electricians held a meeting in Chicago recently for the purpose of formulating plans and arranging the program for the twenty-fourth annual convention of the association, which is to be held in Chicago, September 9 to 12, 1919. The official headquarters hotel will be announced later.

Members who attended the committee meeting in Chicago are: Jacob Grimm, Buffalo, N. Y. chairman; Clarence R. George, Houston, Texas, secretary; John W. Kelly, jr., Camden, N. J.; R. E. Moran, Memphis, Tenn; Claud Convers, San Antonio, Tex.; C. P. Crocker and William S. Boyd, Chicago.

This will be the first convention of the association held in Chicago. It was in Chicago that the first underground wires for fire alarm and police signal systems were laid down under the direction of John P. Barrett, who in the seventies of the past century was superintendent of the municipal electrical service in that city.

Plans are being made to take care of a large attendance at the Chicago convention this year.

Clark E. Diehl of Harrisburg, Pa., is president of the association.

### Western Electric Sales Staff Changes.

George K. Heyer, is the assistant telephone sales manager of the Western Electric Company, New York, having been advanced from the position of railway sales engineer. He has been an employee of the Company since 1902. His headquarters will be at 195 Broadway. E. V. Adams succeeds Mr. Heyer as railway sales engineer. Mr. Adams has been a Western Electric man since 1910 when he began in the railway sales department of the Chicago house. He was transferred to St. Louis in 1912 and the following year came to New York where his headquarters will remain.

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# EDUCATIONAL

## QUESTIONS AND ANSWERS DEPARTMENT.

### Electrolysis.

W. S. P.—Electrolysis is the name given to the action which takes place when electric currents from street-car tracks or other foreign sources are allowed to flow through the lead sheaths of underground cables. At the point where the current leaves the lead sheath and re-enters the earth on its way back to the power-station, electrolytic action takes place which destroys the sheath in spots, permitting moisture to enter in and short-circuit or lower the insulation of the cable conductors.

### Index Notation.

J. P. E.—The small figure to the right of a number signifies the number of noughts contained in the whole number intended: $10^6$ equals 1,000,000.

### Lighting Current Replaces Batteries.

N. A. S.—Commercial or private plant electric light current may be used to replace gravity or other forms of primary battery for main line telegraph operation and for sounder circuits, provided the current available is from a three-wire 110 volt, grounded neutral source, direct current. Procure the information from the electric light company as to the nature of their wiring system. It will be necessary to use resistance coils or lamps of about 1,500 ohms resistance in series with each sounder and of six hundred ohms in series with each main line tap.

### Physical and Phantom Circuits.

F. L. D.—In telephone work "physical" circuit refers to the pair of wires used as a metallic circuit. "Phantom" circuit refers to the extra circuit obtained by employing two physical circuits as a telephone circuit, each of the physcial circuits forming one-half of the phantom circuit. At terminal stations the various wires are connected through suitable repeating coils and condensers.

### Grounded Composite.

C. M. O.—The grounded, or railroad composite circuit is arranged for simultaneous telegraph and telephone operation. The telephone is connected to the line wire through condensers which prevent the telegraph currents from reaching ground. Around each telegraph key and relay in the circuit a condenser is connected to permit the telephone currents to pass over the line when keys are open in the act of transmitting Morse signals. To prevent the telephone currents from being grounded by way of the telegraph circuit path to earth, inductance coils are inserted in the line circuit the telegraph and telephone taps from the line wire. But one wire, therefore, is used for both telegraph signals and telephone conversation.

### Allowable Current.

M. D. D.—The safe carrying capacity of No. 14 rubber covered copper wire is 12 amperes.

### Storage Battery.

James H.—In a storage battery the brown plate is the positive and the grey plate the negative terminal.

### Effect of Temperature on Wires.

R. W. P.—The effect which extreme difference of temperature has upon the resistance of telephone and telegraph wires may be understood when it is stated that between 100 degrees Fahrenheit and 22 degrees Fahrenheit, copper wires decrease 18 per cent. in resistance and iron wire 26½ per cent.

### Branch Offices in New York.

R. E. W.—In New York City there are about three hundred branch telegraph offices. About twenty of these are connected with the main operating rooms by means of underground pneumatic tubes; the remainder have direct wires, either telegraph or telephone, to the main offices. In several cases branch offices have direct telegraph wires to the larger offices in other parts of the country.

### The Phonoplex System.

G. W.—The phonoplex system of telegraphy was invented by T. A. Edison about thirty years ago. The system was employed somewhat extensively for a number of years, but is rarely found in service now. By this system messages could be sent through wires lying on the ground, and through broken wires when the ends of the wires rested upon the ground and not far apart. The method was valuable in case of storm interruptions.

The transmitter consisted of an ordinary Morse key, an induction coil and a source of primary battery, which, when operated sent out regular Morse signals in the form of powerful telephonic currents. The receiver consisted of a specially designed telephone receiver with a large diaphragm which, when acted upon by currents from the distant end caused a small metal ring to move up and down a rod extending upward through the center of the diaphragm, thereby reproducing audibly the intended dot and dash signals.

### Telephone Battery Trouble.

James F. E.—The fact that your telephone battery runs down quickly is probably due to failure of the receiver hook-switch to open the battery circuit through the primary winding of the induction coil when the telephone is not in use.

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## ELECTRO-PHYSICS FOR THE TELEGRAPH, TELEPHONE, AND RADIO STUDENT.

(No. 2)

In this series of articles, begun in the March 16 issue, the purpose is to present an elementary course in modern electrical science; a course which will teach telegraph, telephone and radio students what they should know about late advances in theories of electrical transmission.

In the first instalment an outline was given of the all-embracing significance of such terms as cycle, frequency and wave-length.

Many of the terms used in electrical engineering at the present time were previously employed in mechanics. The terms cycle, period and phase, originally were mechanical terms. In most mechanisms the members go through a series of relative motions, at the end of which they occupy the same relative positions as at the beginning. The completion of such a series of relative motions, with the return of the members to the relative positions which they held at first, constitutes a cycle.

In the ordinary steam engine the cycle corresponds to one revolution of the crank, regardless of the time occupied by the revolution. The time elapsing while a cycle is made is called a period, and the simultaneous positions occupied by the members, at any instant during the cycle, is called a phase.

In recent years it seems that nearly every new discovery in the realm of physics has had something to do with waves, rays or vibrations, generally invisible and intangible. A given electric wave may be so many yards long and a result of so many vibrations per second, but its length cannot be measured with a yardstick or its vibrations counted as one would count the swings of a clock's pendulum. Such characteristics as wave length, frequency and velocity must be detemined by calculation.

This is the point where the student who has not had college training encounters difficulties which discourage him. The mathematical formulae he finds in many books seem hopelessly involved in factors he does not understand. However, let us see how far along we can get with our subject without introducing advanced formulae.

### Water Waves

Take the case of water waves. Suppose you have at your exclusive disposal for a few minutes a swimming-tank filled with water, and that across the tank, from side to side, you can conveniently place a plank. Now, if the plank is three feet above the surface of the water and you have a round metal ball one-inch in diameter and weighing two ounces, which you can roll off the plank into the tank, it will be observed that here you have definite conditions: a ball of given diameter, given weight, and so placed that it may be dropped a given distance before striking the surface of the water. After the ball is pushed from the plank the ball strikes the surface of the water and sinks to the bottom of the tank. But, we observe now that the surface of the water is no longer smooth, being broken up into tiny waves spreading out in all directions away from the point where the ball entered the water. These little waves are quite regular in their motions and movements. We observe that as the waves first to leave the center progress in all directions, a circle is formed which at all times is a true circle. This proves that the waves are traveling in all directions at the same rate of speed. The distance to which water waves can travel is surprising, especially when we consider the insignificant force that may be employed to create them. When the water in the tank has again assumed a smooth surface, the operation may be repeated, and identical results will follow. In fact, should you repeat the experiment many times, in each instance identical results in every particular would be obtained.

Should you, however, alter one or more of the given conditions governing the operation, such as mount the plank at a higher or lower level, make use of a heavier or lighter ball or one with greater or less diameter, the resulting phenomena would differ from those previously produced; the difference depending upon the alterations made in the factors involved. For instance, should you employ a ball made of a heavier metal yielding the same weight with less bulk you would then find that the results would be altered to the extent that the waves would be shorter and less persistent. As we come to the consideration of waves in other media it will appear that the same close relation exists between cause and effect; and in each case where we have control of the cause we can with certainty and accuracy bring about a desired result.

### Vibration Frequencies of Various Phenomena.

Herewith is shown a scale of the vibration frequencies producing different phenomena:

VIBRATION IN AIR.

| | |
|---|---|
| 16 | Lowest audible sound. |
| 32 | Lowest musical note. |
| 128 | Man's voice (conversational). |
| 250 | Woman's voice (conversational). |
| 2,000 | Highest soprano voice. |
| 4,000 | Highest musical note used. |

MORSE MEN **LISTEN** RADIO MEN

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| | |
|---|---|
| 30,000 | Shrill cry of a bat. |
| 40,000 | Highest audible sound. |

VIBRATION IN THE ETHER

| | |
|---|---|
| One million | Unknown. |
| 33 million to | |
| 34 billion | Electricity. |
| 70 trillions to | |
| 281 trillions | Heat. |
| 562 trillions | Light |

Above these follow the vibrations producing chemical rays, X-rays, etc.

*(To be continued.)*

## Shop Talk.

BY THE OBSERVER

What I have written relative to the testing and regulating course, applies equally as strong to the Commerical and Outside Plant Courses, but of course, those courses concern persons outside of the testing and regulating department. I know that there has been and even now are some officials of the telegraph that are not Morse operators; still, I would suggest to all the younger men who expect to remain in the commercial or plant department of the company to take advantage of the Morse Schools conducted by the Western Union and learn the art of telegraphy. A few years' work at the key will make one feel more at home, if in after life, it so happens that he fills official positions, and all know that there are many such opportunities for the qualified aspirant. In large offices there are many opportunities to work short hours, or what is termed "extra" without giving up positions in the other department. I have talked to many linemen relative to the advantages of the outside plant course, trying to show them the great help it would prove to them, but happy-go-lucky-fellows seemed contented and while not saying they would not enroll, their actions led me to conclude they wouldn't. Many of the linemen are good mechanics, men of honor, diligent upright and industrious, but when it comes to making out reports, figuring on various projects, are seriously handicapped, and to all of these I sincerely suggest the value of enrolling in the outside plant course. No one will ever regret the small amount of money spent, nor the time given for such beneficial results. Before concluding my plea for enrollments in the various courses mentioned let me state that all my pleading has been done for so much of the "higher education" as is possible to secure from such sources, and that I am in no manner connected with any of the correspondence schools. I thought it best to make such a disclaimer so that none would think there was any "baiting". Now with that made plain to all I shall in the succeeding articles resume our talks pertaining to actual working circuits, etc.

*(To be continued.)*

## Efficiency Engineering.

*(Continued from page 145, March 16 issue.)*

Every man can develop his personality. If a man believes that he is not by nature gifted to handle other men he should develop his personality in the proper direction and he will be surprised to learn how readily the necessary acquirements can be absorbed to master the situation. It means a great deal to every man's business career that he should study the position he occupies from every angle and in this way make his efforts score success.

Many individuals waste considerable time in endeavoring to figure out why other men are so successful and others again are failures. Some men make little headway in the right direction in their advancement through life, while others reach the goal of success in leaps and bounds. Why is it? some ask. Study yourself and see wherein you lack the essentials necessary to bringing your personal equation up to the standard of the successful man. It is easy. Some think differently of course but they are too ready to jump at conclusions with the result that they become discouraged without any reason whatever except that they wish to earn success without working for it. This is impossible. It is not in the nature of things.

Personality is not a gift as many believe. It is acquired. Develop your resources and you will be surprised at the results. A gold or a coal mine must be developed before it yields its treasures. Man's talents must be developed to the same extent and in the same way.

Study one's own weaknesses and endeavor to strengthen them. That is development.

A friend of ours was appointed canvasser and the first business man he approached to tell his story of the wires as a business producer, to use his own words "literally kicked him into the street." The conclusion he formed was that he was never intended for that class of work. He thought his qualifications as a canvasser were sadly lacking. When he told his story to the manager that official slapped him on the back and said: "Good experience. If that business man had invited you into his office and agreed to all you had said, he would have spoiled you as a canvasser. Now he has put it up squarely to you to show what kind of stuff there is in you. You must prove your metal. Your first attempt to secure business from your point of reasoning has failed. Call on at least three different customers today and see what impression you make on them. Remember one thing, you represent a good company, one that treats the public fairly, that uses every possible effort and contrivance to expedite the public business. As the company's representative you must stand erect and be a real representative and not a make-believe one. Do not for an instant permit a customer to discover that you have weaknesses. If you do he will take advantage of them."

When you are through with your interview with a customer it is to be hoped that you have sufficient knowledge of his business to qualify you to answer any question put to you by the manager. Nothing is so discouraging to a manager as to find that the result of an interview means nothing in the way of information. The manager knows no more about his customer after he has been interviewed by the canvasser than before he was seen. Always make a note

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of the salient points that transpire at every interview. This data is important for future reference and a guide to the succeeding canvassers. Territories should be clearly defined and two or three canvassers should never be permitted to call on one customer unless for some good reason.

The man in question previously referred to turned out to be one of the best canvassers the company had and the reason for this is found in the answer given by the manager to the discouraged representative of the company who thought that all of his succeeding efforts would meet with the same result. In other words the rebuff of the first business man interviewed made a first class canvasser of a man who was positive nature never intended that he should represent the manager in dealing with the clients of the company. Others have had similar experiences. The road to success is never an easy one. If it was it would be crowded with seekers for success without working for it.

Every man in the telegraph and telephone service can acquire a business training that will enable him to conduct the affairs of the company in a methodical manner and this training should be part of every man's life work. The professions have too many men ever ready to declare that they know absolutely nothing pertaining to the business methods of the companies. They should know. The business transactions covering individual cases are similar to those covering large corporations. The difference consists mainly in magnitude. Every man owes it to himself to be able to say that he is qualified to fill the business positions of the company as well as those pertaining to its technicalities.

*(To be continued.)*

## A Trip to the Scenes of Mighty Battles.

Miss Helen Reynolds, daughter of Edward Reynolds, vice-president and general manager of the Postal Telegraph-Cable System, New York, who is serving in France as a member of the Red Cross organization, in a letter to her parents dated Paris, January 23, 1919 gives an excellent word picture of an automobile trip made in the company of Red Cross associates through the devastated portion of France. Her letter in part reads:

"We left Paris about seven-thirty A. M. It was a lovely sunny day, so we could see everything very clearly. Nearly all the roads we traveled were lined on both sides with trees just exactly as we have seen them so often in pictures. We met a regiment of French and an ammunition train, and they looked just as though they were going into action, for they had all their equipment including their guns. We reached Chateau Thierry about noon and saw the famous Marne. The town itself is in very good condition for the fighting was outside, but there were a number of houses completely demolished. We passed through the towns and began to see signs of the fight—barbed wire entanglements, trenches, shell holes and dugouts.

"We passed two little cemeteries filled with plain wooden crosses each with an American flag on it, and all along the route out in the fields and often right along the roadside were single crosses, some with an inscription and nearly all with the boy's steel helmet on top of the cross. You have no idea how those little crosses stand out, and how sacred they appear. We reached Soissons about one P. M. and I wish I could describe the scene to you, but it is almost impossible. Soissons now is practically nothing but a great mass of stones. The whole town, with the exception of a very few buildings, is completely destroyed. The awfulness of it fairly struck me dumb. Seeing it in pictures is bad enough but to see the real thing—well, it is indescribable. We had lunch in a little hotel, the greater part of which was a heap of stones; but we had delicious lunch. Of course, food is easier to get now, but the French are very clever at cooking and can make a good deal out of nothing. We went on from Soissons to Rheims. We passed through many villages, or at least I should say what had been villages, where there was nothing but masses of masonary or great skeleton walls. You see no one, except a soldier, or a stray cat. Oh! the great sadness of it all. As I looked at so many hopelessly ruined little towns I thought of the people who had been there, wondered what their fate was, and pictured their feelings, if they returntd to their 'homes'.

"Before we got into Rheims proper we could see the cathedral standing out against the sky. What a thrill it gave me to see what I had read about so much. We thought Soissons was awful, but the destruction at Rheims was even worse. It is impossible to describe or imagine it, the tragedy is so great. I could only just stand and look. Everything ruined and gone. The big skeleton of the beautiful cathedral—roof gone, windows gone, carving shattered,—just grips your very soul. There must be a frightful punishment in store for those who have done this thing, for we know that God is just. As I saw these things I wished that all the people home who had lost loved ones over here could see them, too. I think their grief would be lessened for they would be glad that their boy had given his life to drive out the fiends who had committed such crimes. We saw German prisoners working in all these towns and the sight of them was hateful. We drove outside of Rheims to see the trenches where there had been such bitter fighting. The French and the German trenches are very near so we saw them both and stood in No Man's Land. It was a terrible sight. As far as the eye could see the land was nothing but trenches and dugouts. The earth didn't look like earth, but was a peculiar ash color. The desolation was awful. It was about sundown when we were there, which made it seem even more lonely. There was absolute stillness and you could see nothing but miles of desolation, with dead trees standing here and there against the horizon. In a shell hole in No Man's Land we saw two dead Germans, one still wearing his helmet. It was almost dark by this time, so we went back to the car and started for home. We passed through many villages, and wherever the searchlights of the car threw their light we saw nothing but ruins."

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## THE TELEPHONE.

ALEXANDER GRAHAM BELL, the inventor of the telephone, on March 3 celebrated the seventy-second anniversary of his birth.

### Independent Telephone Company Takes Over Bell Plant.

The San Marcos Telephone Company and the Southwestern Telegraph and Telephone Company have reached an agreement whereby the Independent Company takes over the plant and service of the Southwestern Company in San Marcos and Martindale, Tex.

### United States Army Signal Corps Telephone System.

The United States Army Signal Corps telephone system now in operation in Europe connects 396 exclusive signal corps exchanges; the various exchanges being situated in France, England and Germany. In Paris six exchanges are maintained.

### New Independent Telephone Association.

Organization of a state association representing 250 independent telephone lines operated in Georgia was perfected during the closing session of the convention of representatives of the majority of the independent telephone companies of Georgia, which opened at the Piedmont hotel in Atlanta, February 18.

R. L. Stewart, president of the Consolidated Telephone Company and supervisor of the Georgia and South Carolina districts of the federal telephone control, was elected president of the new association, which will establish executive headquarters in Atlanta.

The organization will be known as the Georgia State Association of Independent Telephone Companies, and will be affiliated with the national organization.

## INDUSTRIAL.

EDWARD I. PRATT, recently released from army service, has returned to the Kellogg Switchboard and Supply Company, Chicago, as advertising manager.

F. B. JEWETT, chief engineer of the Western Electric Company, New York, has been elected to membership on the Engineering Foundation Board as one of the two trustees representing the American Institute of Electrical Engineers.

FRANK J. WISSE, editor of *The Telephone News*, published at Philadelphia, for the past four years, has resigned from the publicity department of The Bell Telephone Company of Pennsylvania and joined the staff of the Collins' Publicity Service of Philadelphia.

### A Local Battery Substitute.

The diaphragm sounder attachment for mounting upon the local contact supports of telegraph relays, manufactured by the Railways Labor-Saving Device Company of Davenport, Iowa is being found of great value wherever telegraph relays are used. The signals produced are loud enough for satisfactory telegraph service at any rate of speed and no local battery is required.

### Radio Apparatus.

The General Radio Company, manufacturers of apparatus used in commercial and amateur radio telegraph operation, has issued a catalog and price list presenting its line of high grade instruments.

This is the first radio apparatus catalog issued since the termination of the war, and the company is prepared to ship from stock buzzers, flame-proof sending keys, wave meters, inductance and resistance standards, etc.

The old wire chief says: "Don't be afraid occasionally to get out in the open where you may get the worst of it. If you are where competition is strenuous you are likely to be in healthy company and not too many around."


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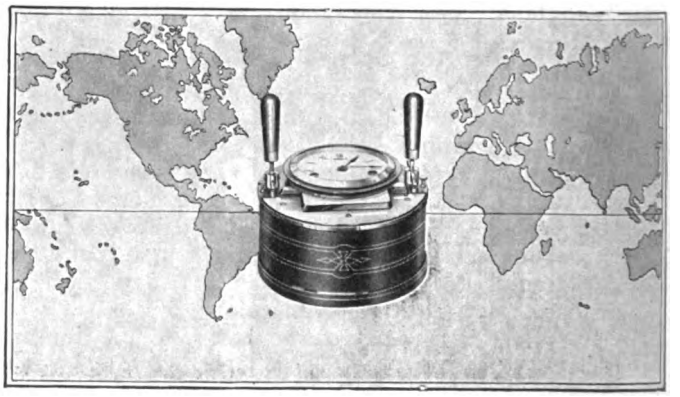

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# Radio Reception Through Static and Other Interference

By ROY A. WEAGANT,
Chief Engineer, Marconi Wireless Telegraph Company of America

Roy A. Weagant, chief engineer of the Marconi Wireless Telegraph Company of America, presented a technical paper describing his discovery of a new law of nature and inventions relating to the elimination of static interferences in wireless communication, before a special joint meeting of the Institute of Radio Engineers and the New York Electrical Society.

The meeting was held March 5, in the auditorium of the Engineering Societies' Building, New York. Among those present were many well-known experts in the art of radio communication, and others prominent in the development of electrical communication.

Mr. Weagant's paper was entitled, "Reception Through Strays and Interference." It was a highly scientific treatment of the subject, covering in detail methods and electrical circuits invented by him and employed by the Marconi Company at its various long distance wireless plants located in the United States.

Reviewing the conditions which prevailed in wireless communication prior to his inventions, Mr. Weagant said:

"Since the birth of wireless telegraphy serious difficulty in reception has existed, due to natural electrical disturbances. These disturbances, commonly called 'static,' 'atmospherics,' or 'strays,' produced in the receiving telephones crackling noises which often drowned out the incoming wireless signals.

"As the distance over which wireless telegraphy was worked increased, it became necessary to use longer wave lengths. This increased the troubles resulting from static, so that in the case of most important long distance circuits, such as those operating between Europe and the United States, static caused such great interruptions to the service that the continuity of communication compared unfavorably with that of cable working.

"An idea of the magnitude of the problem that existed," he explained, "may be gathered from the fact that during the summer months, the energy collected from static at wireless receiving stations was often more than a thousand times as great as that of a normal wireless signal received at the same station."

Describing the natural phenomena surrounding static disturbances, Mr. Weagant said:

"It was found that static disturbances were most severe in summer and less troublesome in winter; also that they displayed a daily variation in intensity, being at minimum between sunrise and noon, and increasing very rapidly to a maximum about sunset; from then on remaining practically constant until shortly before sunrise, when the intensity fell off very sharply to a minimum again."

He noted that accumulated experience had shown these static disturbances to be more severe in locations near to or in the tropics than in the temperate or frigid zones; also that at any given location they vary from day to day, somewhat in accordance with the variation of temperature, being greater on warm days and less on cold days.

Mr. Weagant called attention to the vast amount of study that had been given by many leading scientists and experts to the nature and origin of these static disturbances, and also referred to the innumerable attempts made to secure methods of reducing or eliminating their deadening effects at wireless receiving stations. Of his own investigations, he said:

"So far as I am aware, no success of a major order was obtained with any of these attempted methods prior to my inventions and work in this field."

That portion of Mr. Weagant's paper which dealt with his discovery of a new law of nature secured the closest attention of the scientists present. Stripped of its technical phraseology, this discovery may be described as follows:

Since the inception of the wireless art, "static" has persisted in dominating the wireless signals, forcing itself upon the radio receiving instruments with such strength that frequently the signal was completely submerged and only the static could be heard. All prior attempts to minimize the crashes of static had likewise minimized the buzz of the telegraph signal, thus producing the same net result on the human ear and offering no advance in the perfection of communication. For years, investigators in this field had considered the characteristics of the signal wave and the static wave to be the same. But, Mr. Weagant held an opposite view, believing that a difference existed between the signal and static waves. He realized that, once the difference could be determined and defined, engineering methods of taking advantage of this difference could be devised. The discovery of this difference was the gigantic problem.

Unremitting study, investigation and experimenting led to the solution, which followed Mr. Weagant's discovery that static waves, instead of moving horizontally in space, as do the wireless signal waves, actually move in a vertical direction, from a source either overhead or underfoot. With the determination that the static waves propagate at right angles to the direction of wireless signal waves, he had

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found the much looked for point of difference.

The next step required devising means for taking advantage of the discovery. To overcome the static interference, Weagant invented a new type of antenna or aerial wire, for the reception of electromagnetic waves, which did away with the need for the huge steel masts or towers formerly used at all wireless stations. The Weagant type of antenna is placed but a few feet above the ground and consists of two rectangular loops of wire, separated, but in alignment with each other.

The static waves originating overhead and moving earthward, reach both loops simultaneously, while the signal waves, traveling horizontally from a given direction, set into vibration, first, the loop nearest the direction from which the message is coming, and then actuate the second loop. In other words, the static waves arrive at both aerials at the same instant, while the signal waves arrive at the two aerials at different times.

This method of operation sets up in both loops static currents which are in phase or in step with each other, while the signal currents set up are out of phase. By a proper arrangement of electrical circuits in the receiving instruments, located between the two aerial loops, the in-phase static currents are balanced out, or cancelled, while the out-of-phase signal currents combine and remain in the circuits operating the wireless receivers which record the incoming messages.

In summary of his paper, Mr. Weagant said:

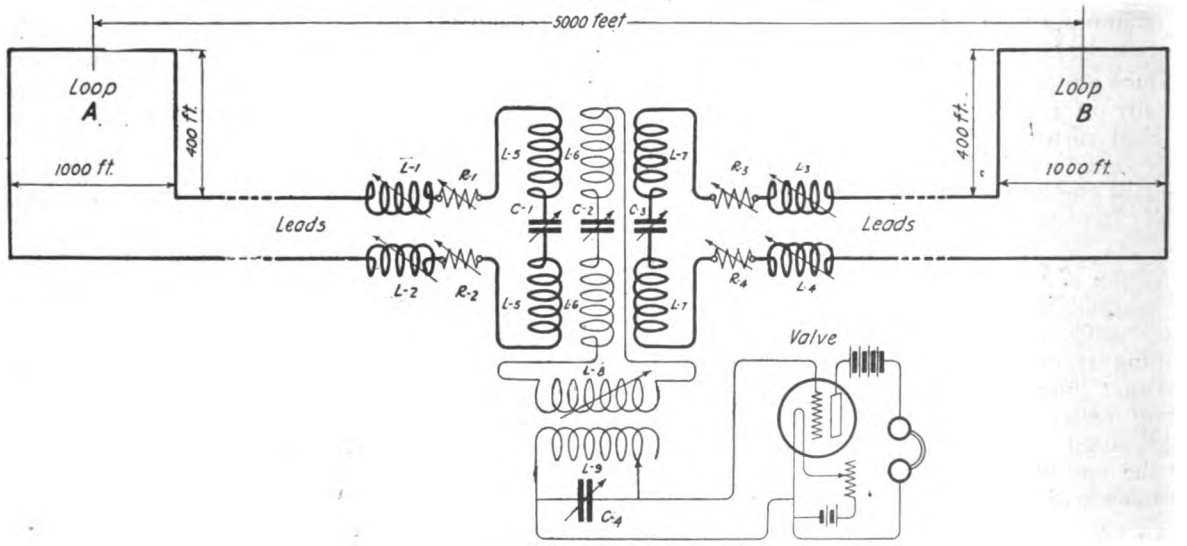
"Continued use has established beyond question that the performance of my system is not occasional or accidental, but is reliable and consistent. With the new system of reception, transatlantic radio telegraphy can now be carried on free from interruptions caused by 'static' of any kind whatsoever, excepting only local lightning. Since the cables are also interrupted by local lightning, it follows that continuity of communication equal to that of cable operation is now possible by radio telegraphy. Wireless has the further advantages of cheapness and greater speed of operation."

Referring to the future of the wireless telephone, Mr. Weagant stated:

"The great barrier in the way of practical and successful radio telephony has also been removed, for 'static' has interfered with wireless telephony to a much greater extent than with radio telegraphy."

Describing the appearance of his new receiving system, Mr. Weagant said:

"It is pleasing to be able to state that arrangements have been perfected which are of such small dimensions that the entire equipment, including aerials, can be readily mounted on this lecture platform and receive radio messages from across the ocean."




EXPLANATORY DIAGRAM OF WEAGANT'S STATIC ELIMINATOR.

Loop A is connected to the primary coils L-1 and L-2, thence to coupling coils L-5. Loop B is connected to coils L-3 and L-4 and thence to coupling coils L-7. The induced currents in the coupling coils act upon the coils L-6 which, it may be seen, lead to the detector circuit and the receiving telephones. Vertically propagated static waves act upon Loop A and Loop B simultaneously, and the resulting static currents flow in the same direction in both loops. This permits of arranging the connections so that the currents due to static may be made to neutralize each other so far as their effects upon coils L-6 are concerned. Now, assuming that the arriving signaling wave first affects Loop A, and the two antennæ are spaced one-half wave length apart, from center to center, the E. M. F.'s generated in the coils L-6 by the signal currents will be in phase and the resultant will be the arithmetical sum of those two E. M. F.'s.

If the separation of the two loops is equal to one-quarter wave length, then the E. M. F.'s will be 90 degrees apart and the resultant E. M. F. will be 1.4 times that of the individual E. M. F.'s; that is, they combine in quadrature.

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## WIRELESS COMMUNICATION WITH THE FAR EAST.

The following is from an address delivered before the Japan Society, New York, February 1, by William A. Winterbottom, traffic manager of the Marconi Wireless Telegraph Company of America.

The Far East has long been in close telegraphic touch with Great Britain, and the channels of communication today between Continental Europe and the Far East are far more numerous than those we possess. It is less than twenty years ago when our telegrams for the Far East were sent across the Atlantic to Great Britain and thence forwarded either across northern Russia or through the Mediterranean on the way to Japan and China. The rate per word was very high indeed—some of the gentlemen present remember paying as much as $3.00 per word from New York City to Japan. Japan at that time could hardly have been further from the United States.

The Commercial Cable Company, with a far-sighted vision, laid a cable from San Francisco to the Far East connecting up the Pacific Islands on the way. Our Far Eastern commerce at that time was quite small and it required considerable courage and faith in the future, to literally sink from ten to fifteen million dollars in the Pacific Ocean. Great credit is due the men who laid the cable, permitting direct intercourse with the Far East and encouraging in a substantial degree the growth of our Far Eastern trade, and making possible a closer friendship and understanding between the peoples of this continent and those of the Orient.

The Pacific Cable brought the Far East much nearer to us than ever before. For in the telegraph fraternity, countries are near or distant according to the number of transmission points intervening. Prior to the advent of the Pacific Cable at least twenty transmissions were necessary to send a message from New York through Europe to the Far East, which, as you gentlemen well know, does not help to make cipher messages more readable. The Pacific Cable reduced the number of transmissions to three or four. If we could still further reduce these retransmissions, to that degree would we bring the United States and the Far East closer together.

This problem has at last been solved by wireless telegraphy, and direct and instantaneous reliable communication by radio is now possible between the Far East and the United States. It is only a few months ago that one of Japan's leading statesmen familiar with the progress of long distance wireless communication stated in a public address, "The Pacific Ocean, which has so long widely separated our two countries, is now no broader than a river." Japan could hardly be nearer.

In 1914 the Marconi Company completed high power stations near San Francisco and Honolulu to compete with the single Pacific cable, and offered its new service to the public. From the beginning it was extremely popular with the Hawaiian business men for they now had competition, and competition in oversea telegraph service is a fine thing. It usually results in cheaper rates, a more expeditious service, and greater satisfaction to the public. Such is the story of the telegraph service to Hawaii. For almost fifteen years the citizens of Hawaii had to pay for every word sent to San Francisco—it mattered not whether it was plain language or code, important or otherwise—35c per word. This rate was never changed and the number of telegraphic communications between Hawaii and the mainland and vice versa, was very small indeed. The Marconi service opened at 25c per word—a reduction of 10c per word—and further, introduced the popular night and week-end letters to the Hawaiians at a rate of approximately 8c. per word. Reflect for a moment—rates reduced from 35c to 25c and 8c per word. No wonder the Marconi Company has so many friends and supporters in Hawaii, that small but important mid-Pacific outpost whose Chamber of Commerce sent a representative to Washington to raise the official voice in loud protest at the proposal for government ownership of all wireless services. The business men of Hawaii have had a practical demonstration of the reliability and rapidity of commercial wireless, and are urging its early resumption by the Marconi Company. Suffice to say that within two months the submarine cable tariff, which has stood so long was lowered to the level of the new wireless tariff, and it is generally acknowledged that within two or three years the number of telegraphic communications to and from Hawaii was increased fourfold.

The trans-Pacific wireless service was not planned to stop at Hawaii. The Far East and even Australasia was our goal. Our Hawaiian station had been built at a cost of almost $2,000,000 in two distinct sections, one to work to California, the other to work with Japan, both sections to work simultaneously. But the war again interfered. The Japanese station built at the same time was taken over by their Navy Department (for Japan, too, was at war) and it was not until 1916 that the station was released to commercial operation nine hours per day. Nine hours per day is not a very satisfactory way of conducting a telegraphic service, but it was the best we could get until peace came, when we could expect the full use of the station.

In 1916 I went to Hawaii to supervise the inauguration of the first wireless service conducted between the United States and Japan. The usual messages of felicitation were exchanged between President Wilson and the Emperor of Japan, Ambasssadors and other notables, and then we settled down to commercial business. The cable rate from San Francisco to Japan, which had prevailed for years, was $1.21 per word with no deferred or other cheaper service. The Marconi service opened at eighty cents per word for urgent communications, a reduction of forty-one cents per word, and also offered for the first time a non-urgent service at forty cents per word, a reduction of eighty-one cents per word. The service immediately was so popular and satisfactory that some means had to be adopted to curtail the amount

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of business offered for transmission, as it must not be forgotten that we were restricted to nine hours per day and that was divided into three periods. It was therefore decided to confine the service to the city of San Francisco, which is perhaps our second largest center of Far Eastern trade.

RELAY AT HAWAII NOT NECESSARY.

Although it was expected to utilize the Hawaiian stations as a necessary relay point for Japanese messages it was soon discovered that practically all messages transmitted from the Japanese station were received with equal facility in California, and it was only occasionally that the assistance of the intermediate station in Hawaii was required. Further recent improvements in the radio art have assured the regularity of this direct Japan-United States wireless service.

I might add that while I was in San Francisco several of the large Japanese steamship companies and export houses expressed their amazement at the high grade service we rendered. The accuracy of the service due to the elimination of relays was most gratifying and, of course, the economy was fully appreciated. From the time of opening the service continued to increase in efficiency and volume of traffic until April 7, 1918, when the Navy Department commandeered our stations and has not yet permitted us to resume commercial operations. I understand that since the armistice the Navy Department has been offering a limited wireless service from San Francisco.

Science at last has brought the United States and Japan very close together, and with the advent of freer and cheaper communication, we may confidently look forward to a constructive age of peace, goodwill and better understanding between peoples of the world once widely separated.

## OBITUARY.

MICHAEL W. CUMMINGS, at one time in the service of the Western Union Telegraph Company at 16 Broad Street, New York, died at his home in Yonkers, N. Y., January 28.

C. F. PATTERSON, aged sixty-five years, manager, chemical department of the Automatic Sprinkler Company, New York, died at his home in Maplewood, N. J., on March 10. Mr. Patterson was well known in telegraph circles, particularly in the west. In 1902 he came to New York and organized the American District Telegraph Company of New Jersey, with which he was identified as general manager for many years.

### Death of Mrs. John J. Ghegan.

Mrs. Ellen R. Ghegan, wife of John J. Ghegan, president of J. H. Bunnell and Company, Inc., New York, died at her home in East Orange, on March 15, after an illness of three months.

Mrs. Ghegan was born in Carbondale, Pa., fifty-seven years ago. She was well known to the fraternity because of her attendance with her husband at various conventions. She was noted for her charities. Besides her husband she is survived by a son, John J. Ghegan, Jr., and a daughter, Mrs. J. H. Wertz.

### Death of Dr. James J. Clark.

Dr. James J. Clark, ninety years of age, died at Washington, D. C., March 19.

Dr. Clark was born in Philadelphia, December 8, 1828.

Shortly after Morse invented the electromagnetic telegraph, Dr. Clark's father was engaged to manufacture telegraph apparatus for the Morse lines, and it was in his shop that some of the first small electromagnet telegraph relays were made, the younger Clark assisting his father in the work.

When the Civil War began Dr. Clark was commissioned to set up short wires between the departments in Washington for the handling of telegraph dispatches. Later he invented one of the earliest successful closed circuit telegraph repeaters.

Dr. Clark is survived by two daughters, Mrs. W. S. Mannix and Mrs. E. Clark-Jones, both of Washington.

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No. 8 NEW YORK APRIL 16, 1919. Thirty-seventh Year

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NEW YORK, APRIL 16, 1919.

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### The Call of the Rail and the Wire.

Two good telegraph operators have gone West. Not in the sense that the doughboy uses this term, but in a plain, geographical sense.

A week or two ago they left New York destined for Wyoming or New Mexico to see life.

These men are not movie-struck, nor have they been reading "Custer's Last Stand," or "The Riders of The Purple Sage"—they have been West before and are young enough to go again.

Think of leaving Nassau Street for Wyoming with the expectation there of "seeing" life! They heard the call of the wire, the rail, and of the silent places, far from the rim of the melting-pot.

It seems that nowhere in the plans of industrial and social reconstruction has heed been given to the cry that is in every man's soul for an opportunity to develop individually. The type of Socialist who long ago parted with the power to think independently and alone; who is such a physical and intellectual coward that he must ever be one of a crowd will, without argument, take your word for it about the beauties of the hills and the charms of the trails. Having no imagination he is not interested in the silent places. The huge melting-pot provides him with the only opportunity he can cultivate. He is an atom, and the phenomenon of molecular cohesion accounts for his presence anywhere.

Philosophers of the Roosevelt and John Burroughs types long ago realized that men must have opportunity to grow as individuals.

Any scheme of social betterment which does not periodically provide the individual with opportunity, in the woods, on the shores, or in the silent places to cultivate personal resource and develop powers of imagination, is foredoomed to failure.

Destroy individuality and you thereby destroy imagination.

The absence of imagination is Bolshevism.

Godfrey de Bouillon and his Crusaders in the year 1097 captured Jerusalem from the Moslems, and for eighty-eight years the Christians occupied the Holy City—or as long as imagination lasted.

Robert Bruce got his inspiration by observing, in solitude, the efforts of a persistent spider; not by a soap-box consultation with the Reds of his day.

The kind of imagination exercised by Joan of Arc, Columbus, and Garibaldi was not the product of the Soviet, but of the silent places.

America needs and has work for great individuals rather than for Red mobs.

Our best wishes follow the two young telegraphers who have gone West with the laudable desire to draw strength from the open spaces and to develop individuality.

### Rewards for Invention.

Elsewhere in this issue appears a list of the awards made by the Franklin Institute for meritorious discoveries and inventions.

For many years past, chiefly in European countries, the work of scientists, physicists and inventors has been recognized by the awarding of valuable prizes, and the custom undoubtedly has served to stimulate scientific research.

Recently an anonymous donor deposited with the Institute of Radio Engineers, New York, the sum of $10,000, the principal to be preserved in perpetuity and the income each year to be awarded to that member of the institute who shall have made the most important contribution to the art of radio during the preceding year.

This, in addition to the Institute's Medal of Honor, now awarded annually, should spur forward American students in the radio field.

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# CURRENT EVENTS

## Executive Office Announcements, Personal Mention, Appointments

### PERSONAL.

DONALD MACLAINE, formerly superintendent of the Western Union cable station at Canso, N. S., and Bay Roberts, N. F., now retired, is visiting friends at Toronto, Ontario. In April he will go to British Columbia to visit relatives.

S. H. STRUDWICK, for twenty years identified with the North Sydney, N. S., cable station of the Western Union Telegraph Company, now retired, is a visitor in New York. Mr. Strudwick introduced the Wheatstone system in this country in 1882, on the lines of the Western Union Telegraph Company.

J. W. LEWIS, connected with the Astor House New York branch office of the Western Union Telegraph Company since 1854, for many years as manager, and who was retired on pension a few years ago, was a New York visitor April 1 and called upon several friends.

### POSTAL TELEGRAPH-CABLE COMPANY.

J. J. WHALEN, manager of the main operating room, New York, has been away from his office during the past month on a trip of inspection throughout the Western and South Western states.

D. F. MALLEN is acting as manager of the New York main operating room during the absence of J. J. Whalen.

HAROLD G. DAVIS, until recently in charge of the printer division, New York main office, has been transferred to the Morse multiplex department as assistant chief operator.

MRS. SULLIVAN, wife of Frank Sullivan, manager of the restaurant on the thirteenth floor, Postal Telegraph building, 253 Broadway, New York, died April 3, of influenza. Mrs. Sullivan was personally known to every Postal employee in New York, having for many years acted as cashier of the restaurant. Before her marriage Mrs. Sullivan was stenographer for the late F. W. Jones, chief engineer of the company.

MCLAUGHLIN, during the past five years important New York branch offices, is now located in the office of City Superintendent E. P. Tully at 253 Broadway.

DANIEL SULLIVAN, for many years manager of the messenger department at the main office, has been transferred to a position in the manager's office, 253 Broadway.

P. A. HICKEY, manager of the company's main office in the financial district, 20 Broad Street, has since taking charge of that office in November, 1918, reorganized the working staff and built up a highly efficient traffic handling organization.

F. C. WILLSFORD has been appointed manager of the company's office at Chattanooga, Tenn., succeeding J. S. Greever, resigned. Mr. Willsford has been manager of the Tuscaloosa office.

### WESTERN UNION TELEGRAPH CO.

EDWARD EVERETT, manager of the money, transfer and time service has been appointed vice-president in charge of commercial of the American District Telegraph Company of New Jersey.

HORACE E. ROBERTS of J. C. Willever's staff has been appointed manager of the money transfer and time service.

MAJOR IRA D. HOUGH, identified with the United States Signal Corps in Washington during the war, has been appointed division traffic engineer of the eastern division, with headquarters in New York.

H. P. CORWITH, ensign in the radio aircraft service,, and who has been engaged in important experimental and research work during the war, has returned to his position as engineering assistant in Vice-President Fashbaugh's department.

F. P. MULLEN, division traffic inspector, Central Division, Omaha, Neb., who has been in New York for some weeks, has returned to Omaha.

FRANK D. GILES, formerly and for many years identified with the executive offices of this company, and chairman of the pension committee, now retired, and who has been in southern California for the past two years, will return to New York about May 1.

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### Edward C. Vanderbilt Appointed Superintendent.

Edward C. Vanderbilt, on March 1st appointed district commercial superintendent at Los Angeles, Cal., for the Western Union Telegraph Company, was born in Philadelphia, Pa., February 29,1880.

From 1901 until 1907 Mr. Vanderbilt was employed in the passenger, traffic and legal departments of the New York, New Haven and Hartford Railroad at New Haven, Conn., following which he spent three years in the fruit business in Florida. In 1910 Mr. Vanderbilt went to California and entered the service of the Western Union Company as stenographer to Superintendent F. H. Lamb at Los Angeles, and during the past eight and a half years has progressed through the various grades of district cashier, assistant chief clerk to district commercial superintendent, special agent, district commercial manager; all in the third district, Pacific Division.

Although Mr. Vanderbilt has been in the telegraph business less than nine years he entered the field after a long training in commercial affairs, and his diversified employment in the third district thoroughly qualifies him for the work he now takes up as commercial superintendent.

## New York Western Union.

W. L. FORRESTER, an operator in this office, died on March 29.

THE MARINE DEPARTMENT it is understood will remain under the control of the navy department until peace is declared.

THE BOOKKEEPING DEPARTMENT of the main office gave an entertainment and dance on April 4 at the Central Opera House, 67th Street and Third Avenue. A large audience was present and the entertainment was a great success. A. C. Gibbs, chief bookkeeper, escorted president Newcomb Carlton among the audience, giving him the opportunity to shake hands with most of those present. Among other officials present were J. F. Nathan, commercial general superintendent; J. A. Berry, cashier; District Commercial Superintendents C. B. McCann, A. Simon, and G. R. Hyland; G. C. Gute, chief operator, and M. Quinlan of the Comptroller's office. Most of the gentlemen present were accompanied by their wives. The entertainment consisted of six acts by professionals. This was followed by dancing.

THE WESTERN UNION EDUCATIONAL SOCIETY will hold its third entertainment and dance of the season on Saturday, April 26, on the eleventh floor of the Walker-Lispenard Building. Dancing will be held in conjunction with the social organization of the various departments.

THE WIRE CLUB of New York inspected the newest and largest post office in the country at 33rd Street and Eighth Ave., New York, on Saturday, March 22, by special courtesy of Postmaster Thomas G. Patten and were escorted through the departments by Assistant Superintendent A. F. Sherman, who explained the methods of handling the mail.

The belt system designed to carry mail sacks instead of messages caught the eye of our main office members as also did the cancelling machines, the capacity of each being 40,000 an hour. The parcel post section contained articles ranging from a spool of thread to several carloads of automobile tires, and the consignment from overseas resembled a curio shop.

Something not generally known is that a special delivery stamp attached to a heavy parcel post package gets the same service as a special delivery letter.

Special objects of interest were the elaborate "spy-galleries" from which the post office inspectors, unseen, assure themselves that your packages and letters do not find their way into the pockets of some possibly dishonest employee.

GEORGE F. SMITH, who was identified with the division traffic engineer's office, died of double pneumonia on April 6. Two days previous to his death he was at the office apparently in good health.

E. D. PITT, traffic engineer, has been appointed division accountant with offices with S. B. Haig, division traffic superintendent. Division accountant is a newly created office.

B. APPLEBAUM, of the commercial news department was married on April 6. His office friends extend congratulations.

## Chicago Western Union.

JOHN R. PIERCE, assistant division traffic engineer, was instantly killed by a street car March 27. Mr. Pierce was on the way from his home to a store in the neighborhood when the accident occurred. Jack Pierce, as he was familiarly known by his associates, had been in the service of the company continuously during the past forty-one years and had progressed through various grades of the service until he reached the position of assistant division traffic engineer. He is survived by his wife and two daughters. Funeral services were held March 31, interment being at Mountain Home Cemetery.

J. J. CHRISTOFEL and Fred Tholke have returned to duty in this office after participating in the great war. Mr. Christofel saw service with the navy hunting submarines in the war zone; Mr. Tholke was a member of the Signal Corps with the American Expeditionary Forces in France.

A NEW REPEATER STATION has been opened at Camp Douglas, Wis., with C. A. Patterson in charge. The force will consist of about a dozen repeater attendants when all circuits to be repeated are connected through the office.

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JAMES BIGGINS, formerly a member of the multiplex staff, and a brother of John Biggins of the quad room, was on March 29 struck by an automobile and suffered the fracture of both arms and both legs.

THE COMPANY'S OFFICE at Sweetwater, Tex., has been remodeled and brought up to date. Four new universal duplex sets have been installed to take care of through traffic. C. G. Hull is chief operator and day wire chief, and J. F. Slack is night chief operator and night wire chief.

WILLIAM C. FOX has been appointed manager of the Topeka, Kansas, office, vice W. C. Carswell, deceased. Mr. Fox is a native of Kentucky where he was born forty-seven years ago. He has held managerships of Western Union offices in many southern states and was district commercial manager of the Central Division, having direct supervision of commercial and traffic of a chain of army camps until March 17th when he received his present advancement.

J. B. DILLON, of the testing and regulating department, Denver, is temporarily located in the Cheyenne, Wyo., office relieving chief operators off duty on account of sickness.

### Waverly H. Jackson.

Waverly H. Jackson, district commercial manager for the Western Union Telegraph Company at Meridian, Miss., was born at Columbia, Tenn., in the year 1890, and began his telegraph career in his home town as operator for the Louisville and Nashville Railroad in 1907. In the year 1910 he accepted the managership of the Postal Telegraph-Cable Company's office at Columbia and a year later was transferred to Atlanta, Ga., as chief clerk of the first district, Southern Division. In July 1913 he was appointed chief clerk of the third district, Southern Division at Birmingham, Ala., remaining in that position until March 1, 1919, when he accepted his present position with the Western Union Telegraph Company.

### Rawlins, Wyo., Repeater Station.

The Western Union Telegraph Company's office at Rawlins, Wyo., is being transformed into a complete and modern repeater station for the company's lines between the East and West. Sixteen universal duplex sets have been installed, also eight motor-generators to supply main line and local current. The instruments, accessories and wiring are all of the latest engineering practice.

The plant was installed by F. A. Stevenson and A. S. Hunt under the direction of R. P. Cowardin, division wire chief.

William J. Morris, jr., is manager and chief operator; Miss B. M. Wing, cashier; C. M. Carlson, night chief operator; A. A. Lyttle, late night chief operator; C. A. Balsley, day wire chief; George M. Eitemiller, day wire chief; and G. W. Babbitt, repeater attendant.

## THE CABLE.

CABLEGRAMS written in plain English or French may now be sent to points in Bulgaria and Turkey, at sender's risk and subject to censorship.

CABLEGRAMS are now being accepted destined to points in German territory on the left bank of the Rhine occupied by Allied military forces.

### Censorship of Cablegrams.

Announcement was made on March 11 that arrangements have been perfected by the Navy Department, through the chief cable censor, with the British chief cable censor, whereby cablegrams between United States territory and points outside of the British Empire will not be censored by British censorship, even though they may pass through British territory. Similarly, cablegrams between points in the British Empire and points outside of United States territory will not be censored by the United States censorship, even though such cablegrams may pass through United States territory.

This arrangement became effective at 12.01 a. m., March 13, 1919, and under it, a cablegram between London and Valparaiso will be censored by the British only, although it will pass through United States territory, and a cablegram between New York and Stockholm will be censored by the United States censorship only, although it will pass through British territory. Up until the present, such messages have been censored by both the United States and Great Britain.

It is impossible to maintain an effective blockade against enemy territory and enemy firms without a cable censorship, and the arrangement just completed does not contemplate the abolition of cable censorship, but only the elimination of double censorship. The new system will not minimize the delay to which cablegrams are subjected as a result of congestion on the cables. There are now not only fewer cables in operation than before the war, but also increased cable business and, in addition, frequent interruption to the cables which are in actual use. The great majority of cablegrams from the United States to points in Europe, Africa and western Asia, pass through Great Britain. The interruption of cables in the North Sea often makes it necessary to forward cablegrams from England by post to the northern neutrals, and a current delay of four to five days in each direction is at this time reported on cablegrams which pass through the Mediterranean. This type of delay should become more and more infrequent, but it will not be obviated by the arrangement just completed with Great Britain.

The United States desires to discontinue cable censorship at the earliest possible moment, and every modification consistent with its agreement to maintain the blockade is being made, but as long as the Allies consider it necessary to continue the blockade against enemy territory and enemy firms, it will be necessary to continue the censorship.

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### British Submarine Cable Work During the War.

The full story cannot yet be told of the remarkable achievements of submarine telegraph cable-laying and repairing authorities during the past five years. Part of it, however, was related by the Earl of Selborne, chairman of the Telegraph Construction and Maintenance Company in London on February 27. In addition to manufacturing 20,000 miles of trench telephone cable, mostly with several conductors, the company made 19,000 miles of submarine cable and its ships were actively engaged, generally on most dangerous work, laying, repairing and diverting cables. The cable-steamer *Telconia* made 75 repairs to cables and laid 24 new ones around the English and Irish coasts. She and the *Colonia* were several times in close proximity to German submarines but thanks to naval protection both ships came through without loss.

### Cable Companies' Dividends.

The Central and South American Telegraph Company on April 11, paid a regular quarterly dividend of 1½ per cent. The company's estimated surplus for the quarter ended March 31, 1919, is $396,000, and the profiit and loss surplus, as of the same date, $2,500,000.

The Mexican Telegraph Company on March 27 declared a regular quarterly dividened of 2 ½ per cent. to stockholders of record as of April 10, the dividend being payable April 16. The surplus for the quarter ended March 31, 1919, after providing for the usual dividend, war taxes and depreciation, was reported at $146,251, leaving an estimated final surplus on March 31 of $3,875,000.

### Progress of Government Control of Telegraphs.

Following the removal of Clarence H. Mackay as president of the Postal Telegraph-Cable Company, on March 22, Postmaster General Burleson on March 29 announced an increase of 20 per cent. in domestic telegraph rates, effective April 1.

Mr. Burleson's order follows:

"The following schedule of domestic commercial telegraph rates shall be effective from April 1, 1919, and continue until otherwise ordered:

| PRESENT RATE | | NEW RATE | |
|---|---|---|---|
| 25c., | *2c., | 30c., | *2.5c. |
| 30c., | *2c. | 36c., | *2.5c. |
| 35c., | *2c. | 42c., | *2.5c. |
| 40c., | *3c. | 48c., | *3.5c. |
| 50c., | *3c. | 60c., | *3.5c. |
| 60c., | *4c. | 72c., | *5c. |
| 75c., | *5c. | 90c., | *6c. |
| 100c., | *7c. | 120c., | *8.5c. |

* For each additional word.

"Day letters and night letters shall be computed as at present, but charged for on the basis of the above rates. Night messages will be charged for at an increase of 20 per centum over existing night message rates.

"Commercial and government leased wires shall be charged for at an advance of 20 per centum over existing leased wire rates, whether such wires be furnished by a telegraph or a telephone system under government control.

"The telegraph rates for domestic United States government telegrams are increased 20 per centum over the present government rate.

"The rate increases herein ordered are made necessary by the increased cost of operation occasioned by wage increases now in effect made during the last year, and are barely sufficient for the purpose."

Mr. Burleson's order was issued by the department without comment other than the explanation that the increase would not affect press rates and charges on wires leased by newspapers and press associations.

Increased wages of employees of all departments of telegraph systems under Federal control, except employees at "nonfunctional" offices and messengers, became effective December 1 last. Employees in service more than a year and a half received an increase of 10 per cent., and those employed less than a year and a half, 5 per cent.

In a statement given out by Mr. Mackay, he said:

"The total telegraph business of the country is approximately $80,000,000. This 20 per cent. increase ordered by Mr. Burleson means an increase of $16,000,000 to the telegraph users.

"That it is absolutely unnecessary to increase telegraph rates is shown by the fact that the representatives of the Postmaster General now find we have been able to hold up our earnings and profits to expectations, and these earnings and profits for the year commencing July 31, 1918, (the date when the government claims to have taken control), will be more than twice the compensation which Mr. Burleson has given our company.

"During the six months ending January 31 we have earned more than the compensation awarded to us by Postmaster General Burleson for a whole year. If we had been allowed to keep our property and operate it we would not have thought of raising the rates, and there would not have been the slightest occasion for raising the rates."

### Major Hough Banqueted.

Upon retiring from service in the Signal Corps, Major I. D. Hough, attached to the general staff at Washington, D. C., during the war, was given a banquet at the Washington Club on Wednesday, April 9, by fellow officers.

Among those who took an active part in the entertainment were Major General G. O. Squier, Lieutenant Colonels Mauborgne and Paddock, and Majors Klock, Whitehead and Van Nostrand.

Major Hough was presented with a valuable traveling bag as a remembrance from the officers with whom he has been associated from the early days of the war until April 1, 1919.

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## RADIO TELEGRAPHY.

### MARCONI NOTES.

JOHN COWDIN, chief electrician, (Radio), formerly manager of the Siasconset station has been released by the navy and appointed manager of the high power station at Chatham, Mass.

SUPERINTENDENT J. B. DUFFY of the marine division has removed his offices from 42 Broad Street to 25 Elm Street, New York.

J. E. HUDSON, chief electrician (Radio), formerly manager of the high power station at Marion, Mass. has been released from the navy and resumes his former position.

C. H. TAYLOR, engineer has gone to Louisburg, C. B., in the interests of the Canadian Marconi Company.

THE EASTERN STEAMSHIP lines has signed contracts with the Marconi Company for wireless equipment and operation of ten of its ships. G. W. Nicholas of Boston acted for the Marconi Company in completing the arrangement.

E. F. W. ALEXANDERSON, of the General Electric Company, Schenectady, N. Y., on Wednesday evening, April 2, delivered a highly important technical paper before the Institute of Radio Engineers, New York, describing interesting results relative to duplex radio telegraph and radio telephone operation, together with highly selective and stray-reducing receivers. The title of the paper is "Simultaneous Sending and Receiving."

DONALD MCNICOL has been elected a member of the Board of Direction of the Institute of Radio Engineers in place of Dr. M. I. Pupin who has resigned on account of press of other duties.

PENDING THE REPAIR of the submarine telegraph cable between the Isle of Man and England, the public telegraphic service is now being conducted by wireless at the usual inland rates. The Admiralty installation at Douglas is being used, the English station being situated at Heysham.

### Radio Communication in the Air Service.

The Under Secretary for Air, in Great Britain, in introducing, recently, the estimates for air transportation services for the ensuing year, speaking of the aerodromes which will be required in Great Britain for civil aviation, said they would be fitted, among other signaling systems, with telegraph and telephone stations, with directional wireless enabling machines to be directed from the ground, and, he was glad to say, with wireless telephones, in which only in the last few days they had achieved a result which they had been trying to secure for years. Until quite recently it was possible for one aerodrome to communicate with another, but not to receive the answer. They now had a wireless telephone with which they could both send and receive on the same instrument.

According to the *Daily Mail*, a squadron of British aeroplanes passing over London recently kept up communication by means of wireless telephony. In this system the receiver of an ordinary wireless telegraph set can be adjusted, it is said, to receive the spoken message, as well as the Morse code, from a telephone transmitter. The perfection of the wireless telephone has been the result of very extensive work at the experimental station at Biggin Hill, following original research work at Woolwich. As far back as March, 1918, British machines were being controlled by telephonic orders, and to-day, it is claimed, conversations can be held with machines over 150 miles from the control station, and trailing aerials are no longer necessary. Conversation can be held without talking through the lips at all, thus the pilot's message is not drowned by the roar of the engine. An appliance has been invented which is placed round the pilot's throat, so that when he speaks the movements of the throat are transmitted as words.

It is understood, also that the government is taking steps to compel commercial airships and aeroplanes to carry wireless telephone or telegraph installations. The larger machines of both types may have to carry both wireless telegraph and telephone installations, the former for accurately fixing their position at night or in fog by communicating with long-distance "compass" stations which give the pilot his angular direction, and the telephone for speaking to passing aircraft and making arrangements with aerodromes for landing.

### Signal Corps Publication.

The Signal Corps units attached to the American Expeditionary Forces in France have issued the fourth number of their service paper, *The Cross Flags*, under date of March 15.

The Managing Editor is Captain W. R. Matheny; Financial Manager, Lieutenant H. Miller, and Editor, R. R. Coates.

A copy of the paper has been received by TELEGRAPH AND TELEPHONE AGE, from First Lieutenant P. C. Lacey, Signal Corps.

### Amateur Radio Apparatus.

Telegraph operators and other students who propose to take up the study of practical radio telegraphy and telephony should not wait until the ban is lifted on amateur station operation before beginning their studies. When permits are again obtainable every student should have his outfit in shape for practical experimenting.

The De Forest Radio Telegraph and Telephone Company, 1391 Sedgwick Avenue, New York, have on hand a large stock of instruments at low prices. A copy of the book describing their apparatus may be obtained by sending ten cents for postage.

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# Piezo Electricity

## Old Discovery Utilized for the First Time During the Late War

When, in the year 1914, the black clouds of war descended upon the earth and Nation was pitted against Nation, "mobilization" became the order of the day: not only mobilization of fighting men and of gray fleets, but of scientific knowledge and of genius. Each Nation engaged in the great struggle called upon its scientists, physicists and inventors to uncover hitherto undiscovered secrets of nature and to forge them into cunning weapons of offense and defense.

Already we have learned what was accomplished by American Signal Corps officers in perfecting means of telephoning between ground stations and flying aeroplanes. The Chief Signal Officer of the Army has stated that due to the mobilization of talent, and the pressure of necessity the laboratories at the disposal of the government accomplished as much during a two year period as might have been expected in the way of development in ten years of peace time.

Already we have learned something of the achievements in submarine sound signaling; the invention of the depth bomb, and the development and use of the paravane employed to destroy floating and anchored mines, and as our physicists find time to tell their stories we shall learn the details of many other interesting developments which aided in wresting from the Hun the claim to scientific superiority.

One line of investigation carried on is that aiming to utilize the phenomena of *piezo,* or pressure electricity.

### PYRO-ELECTRICITY.

For a long time it has been known that there are certain crystals which, while being heated or cooled disclose electricity at certain regions or poles. Crystals producing electricity in this manner are said to be pyro-electric. It has, for instance, been known for many years that tourmaline when heated will attract light bodies to its extremities.

While the wonderful Audion seems to have been invented just in time to have reached a stage of perfection at once available for the needs of war, the developments which followed with such bewildering succession, once the war got under way, brought to the fore the imperative demand that our engineers must be in the van and overlook nothing that would contribute to winning the war.

Devices known as "rectifiers," "filters," and "amplifiers," all aiming to improve old, or provide new methods of instantaneous electric communication, of a sudden claimed the attention of some of our most advanced scientists.

One line of investigation undertaken concerned the possibilities of piezo electricity as a rectifier, filter or amplifier of electric currents, and in this connection piezo electricity is referred to as the effect of pressure between or upon certain crystals.

According to electrical history it was Abbe Hauy, of France, who about the year 1800 discovered that a crystal of calcspar pressed between the fingers so as to compress it along the blunt edges of the crystal, became electrical, and that the crystal retained its electric charge for several days. The fact established was that pressure upon or between crystals in a particular direction produces electricity; electricity which will charge connecting wires in the same manner as ordinary artificial sources of electric current.

According to Hauy this property is possessed in a most remarkable degree by that transparent variety of carbonate of lime known as Iceland Spar. He discovered that if a crystal of this substance in the form of a rhomboid is held in the hand, the fingers touching two of its opposite edges—and two of its parallel planes be lightly touched by the fingers of the other hand, an electroscope in the immediate neighborhood will indicate the presence of electric charge. Up to a certain point as the pressure is increased the electrical effects will be proportionally increased, the electricity being positive in sign.

Hauy further observed, so far as his investigations were carried, that this property is peculiar to those crystalline minerals that are capable of being reduced by mechanical division to plain and smooth laminae; such as the topaz, especially the colorless variety; also, euclase, arrogonite, fluate of lime, and carbonate of lead.

Twenty-five years ago Sylvanus Thompson pointed out that if two opposite edges of a hexagonal prism of quartz are pressed together one becomes positive, the other negative.

### CRYSTALLOGRAPHY.

The masterful researches conducted within the past few years by Dr. A. C. Crehore into the nature of matter and electricity have brought to light many ideas bearing upon the constitution of the atom; ideas which link up the modern electron theory of electricity and old ideas such as those held by crystallographers of Hauy's day.

Dr. Crehore states that electromagnetic theory applied to the atoms in a crystal in their stationery state shows that they are held rigidly in their respective places by the action of the electromagnetic field generated by the constant revolution of the electrons in the atoms. This, however, is combined with a static effect, an effect which would exist just the same if the revolution of the electrons should cease without changing the positions of anything. Although the positive and negative charges are equal and neutralize each other in an atom, yet,

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this is only approximately true when the atoms are great distances apart. The size of the atom is then quite negligible, and its effects the same as if all the electrons were at the center of the atom; but, when the distance becomes so small as in crystals that the size of the atom is appreciable, the fact that all the charges in the atom are not located in the same point, namely, the center, gives rise to an electrostatic force between the atoms.

The wonder is where this knowledge is to lead us to, and what discovery has in store for those so situated that they may prosecute research along these lines in a systematic manner.

Investigations made recently by Alexander Mc Lean Nicolson, in America, have resulted in applying the principles of piezo electricity in a number of ingenious ways to transmit sound vibrations. The possibilities, however, have perhaps only been dimly viewed. Mr. Nicolson built up crystal cells of greatly improved efficiency. Cells weighing but a few ounces were designed which produced hundreds of volts, the wattage, of course, being very low. Rochelle salt crystals were found to be the best for the purpose.

One demonstration made by Nicolson, and which is suggestive of other useful applications of piezo cells, was to attach to a cell a phonograph needle, mounting the cell on a phonograph in place of the regulation reproducer. The terminals of the cell were then connected with telephone receivers through many miles of wire. As the phonograph was started and the needle placed in contact with the revolving record no sound was heard in the immediate neighborhood of the phonograph, but miles away in the connected receivers the voice of Galli Curci was heard as through an open window across the street.

## New Arrangement of Printing Telegraph Circuits.

An Associated Press circuit between New York and Philadelphia operated by means of the Morkrum printer furnishes an excellent example of the flexibility of the Morkrum system. Two wires are provided for the service and normally they are used as separate transmission channels, New York to Philadelphia. At the Philadelphia end five branch offices are forked from the main line circuit. The circuit arrangements at Philadelphia are such that when it is necessary for any one of the five receiving offices to "break," transmission is momentarily stopped on one of the main line wires and that wire used for conversation, Philadelphia to New York.

The old wire chief says: "It may be true that in Denny Brown's case romance and adventure are things of retrospect rather than of purpose, but when I catch a lineman or an operator with a book of poems in his hip-pocket I realize that I have romance where I can put my hand on it, and I always take hold in such fashion that that man does not get away. He is a good kind to have around."

## German Kultur in Belgium.

The severity with which the Germans dealt with the Belgians while forcibly occupying that country from the time Belgium was invaded until the armistice was signed and the Huns retreated towards the Rhine, is indicated by a printed notice, a copy of which is now in the possession of George H. Mills, manager Postal Telegraph Cable Company, Providence, R. I.

It was received from Allen J. West, formerly cashier of the Postal Telegraph office, in Providence, but now of the Four Hundred and Nineteenth Telegraph Battalion, with the rank of second lieutenant.

The warning notice was one of several thousand that were stored in a warehouse at Longwy, France, a few kilometers from the Belgian border. This warehouse had been made use of by a German Signal Corps, and after they abandoned it these posters which they had been placing in buildings and public places, were discovered.

Longwy is in the heart of the iron district of France, its mines producing 90 per cent. of all the ore of that kind secured in that country. The Germans seized the mines about Aug. 12, 1914, and to guard the district against enemy activities of any kind, established and made constant use of field telegraph and field telephone services, as they did in other invaded terrain.

That these services might remain intact everywhere and not suffer damage by reason of surreptitious interference, a notice was printed on white paper with a broad border of black inclosing another of bright red to make it all the more conspicuous. The notice was printed in the German, French, Belgian and English languages and read as follows:

"PUBLIC NOTICE."

"Whoever shall injure any field-telegraph or field-telephone, shall be shot. Whoever shall remove this notice, shall be severely punished.

"Failing the apprehension of the offender, the severest measures shall be taken against the local community where the aforesaid injury has been committed or this notice removed.

"THE GENERAL COMMANDER."

## Printing Telegraph Expansion.

The Morkrum Company, Chicago, manufacturers of the Morkrum printing telegraph system has purchased additional shop machinery costing $10,000 in order to enlarge its manufacturing facilities.

The Company has 250 shop employees, and in addition to a large amount of spare parts and special telegraph apparatus produces one hundred complete printing telegraph sets per month.

THE back files of TELEGRAPH AND TELEPHONE AGE are consulted almost daily by callers at our offices in search of information about the personnel or equipment of the telegraph in days gone by.

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# Artificial Light in Telegraph Offices

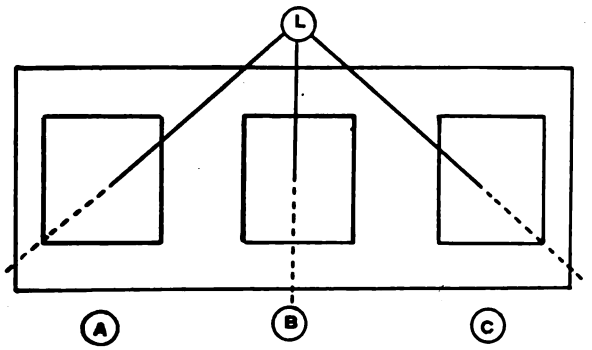
By John H. Mayer, New York

Much of the copy handled in a telegraph office is very hard to decipher. Coming from outside sources, the trouble is beyond the control of the telegraph company and the only remedy applicable is to provide the best light possible for those who have to handle the copy. This involves artificial lighting at night and when daylight is insufficient or unavailable.

With modern electric light appliances and facilities, it should be an easy matter to get all that is desired in good lighting. It is not a fact, however, that good results are always obtained.

Consider the case of three clerks, A, B, and C, working at a table with L, the source of light, a semi-indirect unit with a high-power lamp, and the work-sheets in the relative positions indicated in the diagram.

The illumination on the work-sheet of B will be slightly greater than in case of A or C, due to their greater distance from the source. So that in the matter of illumination B would have some advantage, and to one who has not made a study of the subject, it would probably seem that B has the best of conditions.




But the work-sheets are invariably of light paper and reflect a large percentage of the light falling upon them—a condition aggravated by the use of indelible pencils. In the diagram the solid lines extending from L indicate the direction of the direct light rays, and the dotted lines the reflected light. It will be seen that only in the case of B is the direction of the reflected light directly toward the clerk.

The angle at which the reflected light leaves the working surface is equal to the angle at which the direct rays strike the same surface. This angle, in a great many cases, is such that the reflected light strikes directly into the eyes of B. The result is injured eyesight and lowered efficiency.

Thus it might be that B, not understanding the situation and finding A and C making no complaint, would tolerate without complaint a condition entirely improper; or, B's immediate superior, if complained to, might not understand why B should experience trouble when A or C did not, and conclude that B had no cause for complaint.

The trouble described here may seem exaggerated, or it may be presumed that the objection is largely theoretical. However, such is not the case, as many instances of similar trouble, where light was said to be too strong or insufficient, have been discovered and corrected. This has been accomplished in some cases by shifting the light and in others by changing the positions of the clerks affected.

In the case herein described the objectionable feature has been considered as existing only in the case of B. It is obvious, however, that A or C, should either twist around to a position facing L, would very probably experience the same difficulty as B—the probability hinging upon the angle the light from L makes with the working surface, a condition rarely met with by an operator using a typewriter. In brief, it may be said that the position of the light with relation to that of the worker, and the angle the reflected light makes from the working surface are the determining factors.

The case of a semi-indirect unit has been taken for illustration rather than a direct unit (flat reflector or one with open lower end) because of the increasing use of the former, and in the latter case the direct rays striking the eyes would be more intense and the trouble more obvious. All that has been said of the semi-indirect applies with equal or greater force to the direct system.

The best practice in artificial lighting is to have the source of light situated back of the workers when ceiling units are used, and to the left side—not directly in front—when individual table lights are used.

These conditions are not always practicable but in any case in justice to those who have to use artificial light, and in order that their efficiency may not be unnecessarily impaired by improper conditions, a thorough study of the entire situation should be made at the time of installation of the lighting system or furniture, depending upon which installation is made last.

### Double Speed Morse Key.

The double speed Morse sending key manufactured by J. H. Bunnell and Company, New York, is meeting with a steadily increasing sale to operators working heavy circuits and to operators who have partly lost their grip. The key is mounted on a portable base and is equipped with a cord and wedge so that it may be carried from wire to wire.

The double speed key mounted on base and fitted with cord and wedge complete costs $7.70 and can be supplied by TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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## What Is Electricity?

BY WILLIS H. JONES.

If you should ask any electrical genius what electricity really is, he would probably tell you that it is a force and, like gravity, of unknown consistency.

Then, as though ashamed to confess his ignorance, he will sidetrack the question by telling you how much he knows about its operation and how well he can control it. For my part, I have never been satisfied to let it go so easily. What we call electricity is, I believe, closely related to every phenomenon our various senses acquaint us with, and there is much corroborative evidence pointing in that direction. I firmly believe that electricity is the one great Master Force, originating and emanating from God Himself which, through perfected laws governing its operations—only a few of which man has so far discovered—is responsible for the creation of all animate and inanimate matter.

If this be true, then the various phenomena of animal and vegetable growth can be explained in at least a plausible manner, and the idea can be carried as much further, with certain evidence back of it, as to suggest that possibly the additional phenomena of Life, Death, and even Ego itself, may be accounted for and explained in an equally conceivable and plausible manner. Finally, if such be the case, then immortality itself is assured. Surely, the question is well worthy of consideration. Science is so rapidly deifying electricity through its godlike manifestations that I further prophesy that future theologians at no distant day will study electricity for inspiration and guidance more diligently than they will their present thirty-nine articles of faith.

Let us see what evidence we can produce to support this theory. The first evidence that every concrete body is at base simply a "bunch" of electricity, so to speak, is practically admitted when scientists state that the atom, of which all material bodies are made, when further subdivided into still smaller divisions, itself consists of a basic element in rapid motion which possesses both positive and negative polarity—all the earmarks of electricity. In other words, in the final analysis every known substance turns out to be electricity at the root.

Conversely, then, if the component parts of all bodies turn out to be electricity, it follows logically that all matter must be electrical elements cohering together in different formations and quantities, while each so formed body as a distinctive unit, assuming as it does an individual character and potential of its own, tends to function in a given direction when the conditions are right.

Thus, water as a combination body becomes solid ice, snow, fog or steam, in accordance to the weather and other conditions it is subjected to, yet each product when melted turns out to be merely a different combination and volume of water.

In this way we can readily understand and possibly explain why one common soil, which is the reservoir of all terrestrial electricity, is capable of producing indifferently wheat, corn and other vegetation according to the nature of the seed planted therein. Is it not simply because each unit seed, itself having been previously formed by God's perfected laws operating in a similar manner tends, in accordance with its individual character and potentiality to draw from this common reservoir only such additional quantities as is required to develop, say, first the root? The combination of the seed and root then becomes a different unit with a potentiality suitable for developing next the stalk and blade, which combination in turn develops the blossom and finally the seed for its own reproduction.

Here we see the simile of life, death, and even immortality in vegetable life. After its period of usefulness is passed the stalk disintegrates and returns to mother earth to be absorbed and remingle with the main body of electrical energy. The seed, or vegetable soul, still lives to perpetuate its existence in a new stalk and blade when replanted.

If further evidence that electrical action is present in one form or another in everything relating to life and material growth, it is only necessary to note what takes place in vegetable life when deprived of it, and what benefits are derived when it is supplied. Everyone knows that grass and other vegetable matter will not grow normally in the shade. Deprived of sunlight—and what is sunlight but electricity?—plant life soon withers and dies.

On the contrary, a corn or wheat field, for example, which is flooded every night with strong rays of electric light and otherwise electrically treated between sunset and sunrise, will yield a crop from twenty-five per cent. upward greater than it will if this additional supply of electrical energy is not given. Farmers have verified this fact hundreds of times through actual demonstrations.

When it comes to animate life, the evidence supporting the theory of electrical operation is equally convincing.

It is generally conceded that electricity is present in one form or another in all animate and inanimate substances, although latent in some and manifested in others; and that it is in itself a force. Let us assume that it really is the master force and prime mover in the construction of all new material formations. Then by studying the construction of some completed body, say the human body, see how perfectly the latter's construction corresponds with that of an artificially made human body (if such a thing were possible) designed for producing by electricity the various sensations of life, including those of our five so-called senses.

About the first thing we would learn is that the human body as well as all animate bodies, possesses a network of innumerable little wires, called nerves, radiating from some central point to every unit organ and part of such body: just what would be required to conduct an electric current to all parts. The combustion of food generates electrical energy, a fact well known, hence the nerves are obviously intended to carry off and distribute this energy wherever required.

The stomach, therefore, constitutes the battery required to generate the electric energy required to operate the various subunit organs and thus bring

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about life (motion) and the phenomena of our various sensations. Cut one of these wires (nerves) and sensation in that organ to which it is connected instantly ceases. No current can flow through a broken conductor. In an artificial body so operated an annunciator, common to all circuits, would fulfill, in a manner, the functions of the human brain, inasmuch as it would announce the passage of current through each and every sense organ. That, of course, is as far as we can go in carrying out the simile, but the evidence seems quite sufficient to convince anyone at all familiar with the operations of electricity that there are sound grounds for suspecting that our bodies were specially designed to be operated and maintained by electrical energy. "But," says the doubter, "granted that it may be the active agent, how can it do the work intelligently?" At first this question seems to be a sticker, but the possibility of its being capable of doing so can be answered by asking another question: "How is it that this identical force can be and really is so controlled, even by man, that it will produce heat, light, power, and create other conditions, respectively, just as he wills?" Isn't it simply because there is an intelligence behind it all? Man first plans and then designs his respective electrical tools, by means of different dimensions, form of construction, etc., so that each unit, although operated by one and the same source of energy, will develop singly or in combination with others a separate and distinct product. Obviously what men can do in a miniature way, God can do on a much grander scale.

Let us now consider the human body as being a complete unit tool in like manner equipped with potentialities and other properties, upon which a master force plays, and see if we cannot figure out how the phenomena of our various senses might possibly be produced. Obviously, even if the electrical operation in both the human and the imitation human body referred to were identical and correctly outlined, no effect produced on any organ in either could be felt unless there primarily existed in such unit body an intelligence, or mind energy, to give distinction and individuality to each sense effect produced. This accounts for the necessity of an ego or consciousness in every living animal body. Now, what is this ego? Of course, no one can answer this question definitely or produce any evidence to support his claim, but I submit the following theory:

Ego, or the sense of *I am* we each experience, may possibly be the Master Mind, or some attribute thereof, the energy emanating from which constitutes and governs our thoughts. It is possibly the same Ego or Mind in each and every person, hence you and I may be one and the same spiritually, yet realize it not. We think and act differently, however, because our respective material bodies upon which the Master Mind plays, possessing different potentialities as they do, develop different products of character and degrees of intelligence. There is no necessity for one's conceit that God picked him out singly and made an Ego especially for him. More likely He didn't. If this be true, then we always were and will continue to be in some isolated unit body now and hereafter, as long as the energy emanating from the Master Mind finds properly arranged material bodies to act upon. Thus, immortality is assured. I cannot die as long as the Master Ego exists, because, being a part thereof, I still exist, yet, as Smith or Brown, may be temporarily dead for want of a living body to give me individuality. But in Baby Jones, or some other newly formed unit body or receptacle of life, I may experience the sense of existence and live another life which I then will begin with all the knowledge man has so far acquired up to date, and enjoy not only all the comforts and luxuries he has already provided, but all the additional comforts man, including myself, may invent during the period of my next existence. This may be my future reward. In each succeeding life I will probably live under easier and happier conditions, until God's plan of evolution is eventually completed.

If further evidence is required to prove the practicability of electrical control from a Master source, it is only necessary to call attention to the similar but feebler operation of the hypnotist. Here the stored magnetic energy from a Master Mind overpowers the energy generated by a weaker mind and causes the subject to think and act as the hypnotist wills, thus following one of the well known laws governing electrical action.

Telepathy is another manifestation of the transit of electrical force from one point to another, due to the same laws, but the exchange usually takes place without any willful efforts being made by either party involved to bring it about. The operation, however, is identical with that of hypnotic or willfully directed action. In telepathy the proper conditions are accidental, one might say. Every human body is charged to a greater or lesser degree with electricity. In some it is a positive and in others a negative polarity, while no two persons probably are charged to exactly the same degree of potentiality. Hence, whenever two differently charged bodies approach one another sufficiently close to enable the high tension one to break through the resisting intervening space, the surplus charge in one body passes to the other in order to establish an equilibrium, thus following another well established law governing electrical action. It is due to such transfer of energy that one sometimes senses the presence of another in his or immediate vicinity almost the moment a second person enters the room, despite the fact that there may be nothing else to cause one to sense such presence.

In this way the interaction of electric discharges may cause us to like or dislike another person, according to whether the polarities of the two charged bodies are like or unlike. Thus, two persons charged in the same degree with, say, positive electricity, will tend to repel one another, due to the fact that like poles repel and unlike attract. Same when both are negatively charged. But where one is strongly positive and the other equally strong negatively, they are attracted in an equally strong manner. It is, therefore, reasonable to believe that the phenomena of love, friendship, and hate are each possibly due

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to merely different degrees of electrical potential and polarities existing between ourselves and those whom we meet.

The logical conclusion to be drawn from the facts and arguments herein presented, therefore, is that one basic force is accountable for all material and psychological developments, and as electricity is the acknowledged base of all earthly energy, beyond which we cannot go, and is present in one form or another in all concrete bodies, even to the smallest atom and its subdivisions, it follows that electricity may possibly turn out to be the actual Master energy emanating from the Master Mind or other seat of power, the Master Mind playing upon our physical bodies, giving each of us the individual sense of *I am,* while the energy, being God-directed, brings about results in a strictly methodical manner. Finally, life is motion; death, the absence of motion, and concerns concrete matter only, our Ego, being a part of the Master Mind, and therefore one and the same in each of His creatures, lives forever.

Long ago the preacher exclaimed: "Vanity, vanity; all is vanity," but today it seems more appropriate to say: "Electricity, electricity; all is electricity," and we are beginning to suspect that Thou art God Thyself, omnipotent and ever-present.

## Calvert Townley, Nominee for President of the American Institute of Electrical Engineers.

Mr. Townley entered the electrical field at the time when the alternating-current system was in its beginning, and he has given its development very close study. His early experience combined both commercial and engineering matters, and his engineering training and the connections he has established have given him an understanding of electrical apparatus and electrical operation which has made his administrative work very practical and highly effective. Mr. Townley became connected with the Westinghouse Company about 26 years ago and to him much credit is due for the large measure of success which has attended the commercial development of the apparatus designed and manufactured by that organization. He was for six years connected with the New York, New Haven & Hartford railway system, going to Hartford originally to take charge of the electrification work for the system, and also to manage its related trolley properties. He organized and conducted the investigation of the electrification problem out of New York. In 1911 he severed his connection with the New Haven system to re-enter the service of the Westinghouse Company. At the annual meeting of the Engineering Council held recently Mr. Townley was reappointed chairman of the Water Conservation Committee, also reappointed a member of the Reconstruction Committee of the Council.

TELEGRAPH AND TELEPHONE AGE is the American technical magazine most frequently quoted and copied by Journals in foreign countries.

## THE DEVELOPMENT OF THE AUDION.

### Communication.

To the Editor of TELEGRAPH AND TELEPHONE AGE.
Dear Sir:

I have read with much interest the article in your number dated March 1, 1919, entitled the "Audion Amplifier—Its Development by Lee de Forest." There is a statement in that article which is not in accordance with the facts and to which I draw your attention the more readily because I have a very great admiration for the work done by Dr. de Forest in the invention of the audion. The credit due to him is so great that it does not need to have claims made on his behalf which are not warranted by the facts. On page 109 the article in question states:

> "But it is not true to say that, "In all the 3,400 miles of line, there is no one spot where a man may point his finger and say, 'Here is the secret of the transcontinental line; here is what makes it possible to telephone from New York to San Francisco.'
>
> "One element after another came—first the Bell receiver; then the Berliner microphone; then adequate line construction, and Pupin coils to prevent voice distortion, but the one last missing link—the genuine sine qua non is the audion amplifier of de Forest. His little lamp links the Eastern with the Central, the Central with the Mountain, and that with the Pacific Coast lines."

While our repeater employing the audion principle is used in the transcontinental line, and gives most successful results in connection therewith, it cannot be properly characterized as an essential of that line or to transcontinental operation. The successful rendering of transcontinental telephone service depended not solely or even principally upon this repeater element itself. A multitude of other problems was involved concerning the characteristics of the line and the apparatus and circuits associated therewith, and it was on our solution of these problems rather than on the audion and our development of it as a telephone repeater that transcontinental telephony depended.

One of the available alternatives not involving in any way the use of the audion would have been to have employed the so-called mechanical repeater referred to in the earlier part of the article in question and there incorrectly described as an unsatisfactory piece of apparatus. I, myself, as well as many others, have talked from New York to San Francisco, employing only these mechanical repeaters and getting thoroughly satisfactory service. Many mechanical repeaters are today in service and are giving satisfactory results. While it is true that the telephone repeater which we have developed from the de Forest audion is the best repeater known to us, there can be no question that if the audion had never been invented, transcontinental telephone service would have been rendered by this company when it actually was.

[Signed] BANCROFT GHERARDI,
Acting Chief Engineer,
American Telephone and
Telegraph Company.

New York, March 28, 1919.

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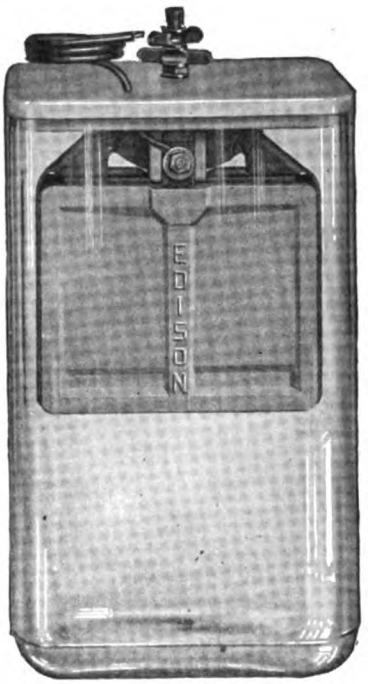
# FOR CLEAR TRANSMISSION

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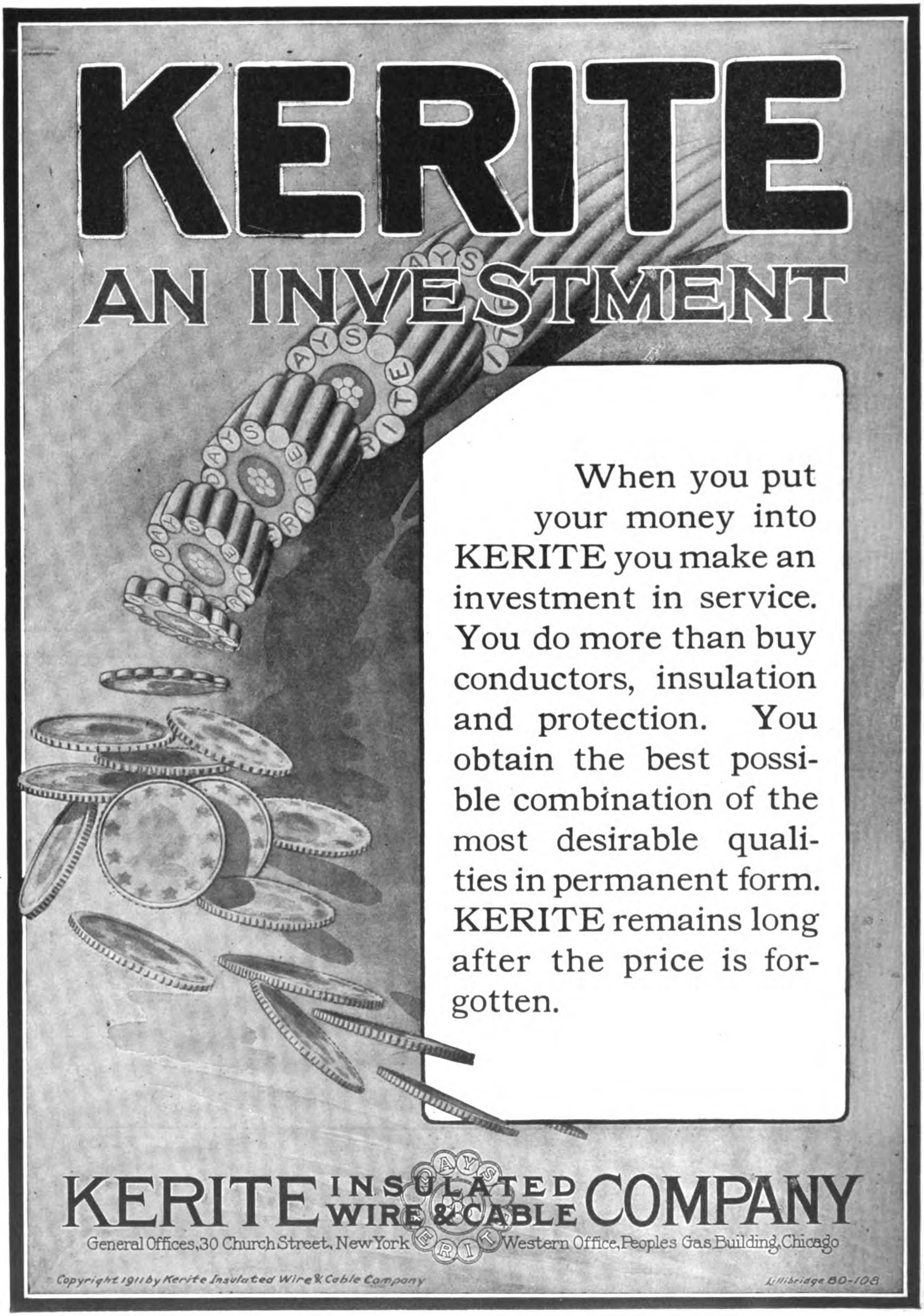


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## THE RAILROAD.

### American Railroad Association Telegraph and Telephone Division.

Under date of March 24, Martin H. Clapp, Chairman of the Telegraph and Telephone Division issued circular No. 1, addressed to all members and reading as follows:

"At the meeting of the Association of Railway Telegraph Superintendents held in Chicago on December 5 and 6, 1918, a resolution was passed providing that the corrections and additions to the specifications for underground conduit construction for electric cables, recommended by the subcommittee of Special Committee No. 1, be embodied in the specifications which were ordered printed in the Proceedings of the meeting, and further, that within thirty days after the Proceedings had been issued the members were to vote as to whether or not they would accept the revised and corrected specifications.

"It has now been decided to present the specifications to the June meeting of the Telegraph and Telephone Division, of the American Railroad Association, for adoption as recommended practice, the specifications to be mailed for the consideration of the membership, thirty days in advance of the meeting. Meanwhile any criticism of these specifications which the members desire to make at this time will be considered by L. S. Wells, superintendent of telegraph and electricity, Long Island Railroad, Pennsylvania Station, New York City, and his committee, if submitted to him not later than April 15, 1919."

THE MAINTENANCE OF TRAIN DISPATCHING and other telephone circuits on the Erie System has been transferred from the maintenance to the telegraph department, and these circuits extending from New York to Chicago hereafter will be under the direct supervision of E. P. Griffith, superintendent of telegraph, R. H. Corson, assistant superintendent, and J. P. Kreiter, telephone supervisor.

The following inspectors are also transferred to the jurisdiction of Mr. Griffith: P. J. Kerchies, Jersey City, N. J.; T. J. Hurley, Susquehanna, Pa.; J. T. Rogers, Hornell, N. Y.; M. F. Baker, Salamanca, N. Y.; A. G. Tyler, Buffalo, N. Y.; H. L. Hoard, Meadville, Pa.; C. W. Savelle, Youngstown, Ohio; C. E. Cukerman, Galion, Ohio; and H. A. Daake, Huntington, Ind.

JOHN H. FICHTL, is manager and wire chief of the Sapulpa, Okla., office of the St. Louis and San Francisco Railway Company. Mr. Fichtl has had long experience as wire chief, manager, and train dispatcher on the large trunk lines of the west.

C. S. RHOADS, superintendent of telegraph of the Cleveland, Cincinnati, Chicago and St. Louis Railway Company, and of the Cincinnati Northern Railroad, writes us that the AGE improves with age, and recommends that we keep up the good work.

### Frank P. Gillespie Appointed Superintendent.

Frank P. Gillespie, recently apointed superintendent of Telegraph of the Texas and Pacific Railroad, The International and Great Northern Railroad, and associated lines, succeeding the late Frank Tremble, was born near Aberdeen, Miss., March 29, 1870.

When seventeen years of age Mr. Gillespie entered the service of the Western Union Telegraph Company as messenger at Corsicana, Tex. Becoming an operator a year later he entered the service of the Cotton Belt Railroad in 1889, remaining with that company until 1892.

In 1893 Mr. Gillespie accepted a position as operator with the Texas and Pacific Railroad with which company he has remained continuously to the present time. For a number of years he has been chief clerk to the superintendent of telegraph and his advancement to the head of the telegraph department of that road brings to the office a man thoroughly qualified to maintain the high standard of service established by his predecessor.

### Draughtsmen's Pocket Book.

This is a handy book for the draughtsman's table. It contains 127 pages of engineering data constantly in demand by the man who is engaged in drawing plans and specifications. It shows how to solve equations using graphs; tapers and angles; mensuration; trigonometry; coefficients of friction; wire gages; specific gravity of various substances; weights of metal in various dimensions, et cetera. The price is $1.00 per copy.

### Old Time Telegraphers and Historical Association.

Frank Kittôn of the office of Vice-President G. M. Yorke, Western Union Telegraph Company, New York, has presented to the Old Time Telegraphers and Historical Association, to be placed among its archives, two photographs. One of them is a picture of the first telegraphic instrument, a Morse register. In each of the four corners of the photograph are the pictures of Professor S. F. B. Morse, Alfred Vail, Benjamin Franklin and Cyrus W. Field.

The dimensions of the instrument were sixteen inches long, six inches wide, seven inches high. The diameter of the two magnets was three inches each. The width of the paper tape was one and one-half inches. The weight of the instrument was twenty pounds. This is the register that was used in the Baltimore office on the first line erected in 1844 to demonstrate the possibilities of the new invention. Alfred Vail had charge of this instrument, while Professor Morse had its counterpart at the Washington end of the line.

The other picture is a photograph of the telegraph and press tent, Milburn residence, Buffalo, N. Y., after President McKinley was assassinated in 1901.

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# EDUCATIONAL

## QUESTIONS AND ANSWERS DEPARTMENT.

### A. C. and D. C. Motor Circuits.

F. S.—Your experience, that an A. C. 3-H. P. motor will operate on a lower capacity fuse than a D. C. motor of the same rating, may be due to several causes. Ordinarily the difference should not be so great as you report. The design of the motors and their respective conditions as to required starting current have a material bearing upon the fuse capacity.

In the case of the D. C. motor if it starts quickly the counter electromotive force opposing the supply current within a brief period cuts down the current strength considerably. Under no-load, or light-load at starting the maximum current does not last long enough to blow the fuse.

In a neutralized, single-phase series alternating current motor, the armature reaction flux, which performs no useful work, is neutralized by means of the stator winding, and unless the armature attains running speed quickly a high starting current flows long enough to blow the fuse in the power leads. Frequently auto-starters or compensators are employed to avoid this difficulty. However, we could not say positively why the difference exists in the case of the two motors you operate without knowing the types, condition of each motor, load conditions at the start, etc.

### Operating a Heavily Escaped Line.

C. H. M.—If the insulation of a telegraph line is so defective that during rain storms it is impossible to operate circuits from one terminal to the other by the usual methods; that is, by means of relays and keys, a scheme sometimes resorted to by chief operators for testing purposes is to connect a telephone receiver in series with a condenser around the main line binding-posts of the testing relay. If the wire chief at each end of the circuit makes use of this arrangement conversation may be carried on with the Morse key at times when not enough current gets through to operate the regulation relays. Telephone receivers register differences of potential so low that they will not affect the armature of a telegraph relay. A little practice will enable an operator to read the Morse signals in the telephone receiver as easily as from a sounder.

### Permanent Magnets.

J. W. D.—The difficulty you have experienced in making permanent magnets is not unusual. The trouble undoubtedly is that you have not secured the required grade of steel. High-carbon steel, containing about 1 per cent. carbon, or alloy steels containing along with a certain percentage of carbon, a quantity of one of the metals, tungsten, chromium, molybdenum, or vanadium, are what is known as magnet-steel. Also, there is the question of glass-hardening, as well as tempering and ageing. It may be realized that these considerations result in magnet making being something of a fine art.

Ordinarily, if the number of magnets needed is not large it pays to purchase them ready made to the sizes desired. If you request it we can put you in touch with a reliable manufacturer of permanent magnets.

### Postmaster General Burleson.

T. K. J.—Albert Sidney Burleson has held public office since he was twenty-two years of age. He was born in the year 1863, and was admitted to the bar of Texas in 1884. In the following year he was appointed city attorney of Austin, and continued to hold that office by elections until 1891; then was appointed a district attorney by the Governor of Texas, and by elections continued to hold that office until 1898; then was elected a Representative in Congress, and continued to serve there until March, 1913; then was appointed Postmaster General, an office he still holds.

### Boston-Washington Underground Cable.

A. W. P.—The Washington-Boston underground telephone cable is 435 miles in length. Practically all of the circuits in this cable may be phantomed. The phantom as well as the physical circuits are arranged for loading. In the center of the cable there are fourteen pairs of No. 10 B. & S. gage conductors. Outside of these are thirty-six pairs of No. 13 gage conductors. In the spaces between the No. 13 gage conductors and the No. 10 gage six pairs of No. 13 gage conductors are inserted. The outside conductors consist of eighteen pairs of No. 16 gage wires.

### Early Telegraph Salaries.

S. A. D.—During the period 1855-1860 the salary paid first-class telegraphers in this country was, in large offices $60.00 per month and in small offices $50.00 per month. Chief operators received $75.00 per month.

### Telephone versus Telegraph.

G. T.—The information you have to the effect that since the invention of the telephone, telegraph traffic has gradually fallen in volume is wide of the mark. In the year the telephone was invented (1875) the number of telegrams passing daily through the New York main office of the Western Union Telegraph Company was 30,000. At the present time the same office handles in the neighborhood of a quarter of a million telegrams per day.

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## ELECTRO-PHYSICS FOR THE TELEGRAPH, TELEPHONE, AND RADIO STUDENT.

Some of the figures appearing in the scales of vibrations producing various phenomena, as given in the April 1 installment of this series of articles, appear to be stupendous.

At first sight one is puzzled to know how it has been possible to count so many distinct happenings in one second as trillions. And there is the question of the relationship between vibrations and waves.

### SOUND WAVES.

As far as sound waves are concerned there is a simple method of computing vibrations and calculating wave-lengths which does not require the employment of advanced mathematics. Suppose you have a small battery motor and that you attach rigidly to its shaft a toothed gear-wheel and that the motor is so situated that when the shaft is rotated the gear teeth will tap lightly the edge of a conveniently mounted calling card; the card held rigidly as in a vise.

Now, when the battery circuit is closed starting the motor it is possible to administer a given number of mechanical shocks to the card in a given time.

Suppose there are 100 teeth around the periphery of the gear-wheel and that in ten seconds' time a speed indicator applied to the end of the motor shaft indicates fifty revolutions. Multiplying fifty by 100 we find that there were 5,000 shocks or vibrations given to the card in that period of time (ten seconds). In order to ascertain the number of vibrations made by the card in one second, 5,000 is divided by ten, giving 500.

Reasoning thus the following simple formalae have been obtained to simplify the solution of problems of this kind:

If $V$=Number of vibrations per second; $S$=Velocity of propagation; and $L$=Wave-length; then

$$L=\frac{S}{V};\quad V=\frac{S}{L};\quad S=VL.$$

Another factor to be taken into consideration, is the constant of velocity of propagation. It has been determined that sound travels through air (at ordinary temperatures) at the rate of 1,125 feet per second, so that in the case just referred to, where the card was made to give 500 vibrations per second, it is evident that any person stationed within a hundred feet or so of the card would hear a low, buzzing sound, and by means of the formulae we can readily find out what we wish to know regarding the sound waves produced.

To find the wave-length, for example, divide the velocity (1,125) by the number of vibrations per second (500); the result shows a wave-length of 2¼ feet. In the same manner we may determine the wave-length of sound given out by a tuning fork or metal bell—simply by increasing the rotary speed of the toothed wheel until the card gives out a sound at the same pitch as the bell or fork does when tapped.

Another thing we learn is that the speed at which sound waves travel through air is dependent upon the temperature of the atmosphere. It has been found that at a temperature of freezing, sound travels at a rate of 1,090 feet per second, and that the increase in velocity for every degree Centigrade above freezing is two feet.

With this knowledge we can readily calculate the distance from us at which an observed lightning flash takes place. Suppose that during a storm we observe a flash of lightning, and a stop-watch shows that four seconds have elapsed between seeing the flash and hearing the thunder; and suppose that the temperature of the atmosphere is 20°; then we may calculate that the sound in this instance traveled at the rate of (2×20) + 1,090 (= 1,130) feet a second. In four seconds, we may observe that the sound waves have travelled 4,520 feet, which proves that the flash seen was nearly a mile away. The fact that the speed of light is 186,000 miles per second makes it practicable to consider it instantaneous for the distance of a mile, so that we see the lightning flash practically as soon as it takes place; but the resulting sound has to travel through the air as sound waves and requires an appreciable time to reach us.

## Shop Talk.

BY THE OBSERVER.

Mention was made relative to the Morse School in our previous article and the thought has struck me that before candidates are accepted into any of the departments alluded to that they should be required to stand an examination somewhat similar to that given new applicants for employment. Now I mean in plain words that even though one has been a first class operator and is an all around jolly good fellow, with several years' service with the company, he should show such educational fitness as shown by new applicants. If this was done there would be a better class of men admitted; all of those with the proper dispositions would use some of their otherwise idle, or frivolous time, for

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study. No less an authority than Herbert Spencer lays stress upon the fact that we soon forget many of the things we learn, and our own experience is in full accord with this regrettable, yet true state of affairs, hence to thwart the slipping away of our knowledge of mathematics, geography, spelling, etc., it is necessary that instead of putting in so much of our spare time in the reading of fiction, that we use a part of it to review our scholastic work. To those that would do this great comfort will result, for to be able to say that we have not forgotten what we learned at school is indeed a sweet solace to any progressive minded person. I have often heard people say: "When I went to college I could work practically every problem in the book, but now I hardly know, how to start them." There is but one conclusion and that is, "out of sight, out of mind," or, they closed their minds to all of it when their college days ended, just as many others do, and there is no surprise as to their present condition. A little play now and then is relished by all, but all play and no work will make Johnnie a dull boy. To those whom I am trying to reach it is suggested that they never read light literature just previous to taking hold of technical studies, as it has a tendency to cause the more difficult work to seem unusually dull and laborious. Tackle your technical studies first, a little at a time and after due reflection, then your favorite newspapers, etc. I have made the statement many times and I cheerfully repeat it, that is, if there were more men subscribing to the AGE, studying carefully the articles therein, preserving the technical ones as a reference file, the better the class of scholars we would find in the rank and file of all telegraph offices, and a better grade of all around T. and R. men. You cannot create something out of nothing, and as your friends cannot think for you, but merely suggest, your own salvation is within your hands and for every day that you waste, it is like an absentee at school, you miss the value of that day's lesson, whereas the others have progressed that much more. I care not whether one be rich, or poor, there is nothing brings sweeter solace, after health, love and religion, than education.

(*To be continued.*)

## Efficiency Engineering.

*(Continued from page 168, April 1 issue.)*

Several readers have recently requested us to state what, in our judgment, would be the effect on personal efficiency if socialism or government ownership of the telephones and telegraphs become permanent in the United States. They wish to know if the incentive to excel and the power of initiative would not be discouraged by government ownership. Under government control, methods of transmission will remain as they are for the reason that governments would not likely adopt new ideas that would lead to scrapping old apparatus. Because of the large expense involved, which the political party in power could never justify to the voters. A corporation on the other hand does not hesitate to scrap millions of dollars worth of property in order to provide superior facilities to meet the demands of the public.

This subject is probably becoming a serious question with many telegraphers in this country. It need not be, however, and those who make it so are burdening themselves with troubles that may never overtake them. Socialism is hard to define. No two advocates of this form of government give the same explanation as to just what it represents. The best authorities, however, tell us that socialism is a movement, and it consists of placing in the hands of the government the possession and control of all industries including the mines and mills and shops and roads and forests and land—all the industries and natural resources of the nation. This is said to be the chief aim of Socialism.

Will such a program destroy the initiative in individuals? No doubt it will in a large measure, but the adoption of a program of this character and magnitude in the United States is very remote and it need not worry anyone identified with the wire service.

A great deal is being printed in these days about socialistic Russia and the spread of that doctrine in Germany and other European countries. This is all due to the unsettled conditions growing out of the world war. The United States is a country of opportunities. Every individual desires a chance to show what is in him and the only way he can do that is for corporations to control the industries of the nation. Some argue that many of the corporations are managed primarily for robbing the people. Laws should be enacted to remedy such conditions rather than turn these vast properties over to municipal or state ownership or managements. What we need is an efficient and effective code of laws to reach all offenders. It would, in our opinion, be a national disaster to encourage government or state ownership of the industries that go to make up a nation. All men are not created equal, notwithstanding the declaration of independence to the contrary. Many have a capacity for work that staggers belief, while others pass through life with as little trouble as it requires to make both ends meet. Personal efficiency, of course, tends to energize thousands of persons who would otherwise never rise above mediocrity. Efficiency is the electromotive force that makes men better and increases their capacity to do the work assigned to them with less fatigue and great satisfaction. It is the compelling force that turns duties into pleasures. It is the optimism of daily life, and the seed of socialism will never grow where efficiency flourishes. Socialism is the enemy of enterprise. It deadens the initiative and reduces the standard of manhood to a low level.

Rather let us have competition which makes us all do our utmost to make the world better by each satisfactorily accomplishing his part in the little things of life. Competition promotes efficiency. One goes hand in hand with the other and both make the world safer to live in. Socialism is

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revolutionary and destructive. Competition and efficiency are elevating and constructive.

Those who have the welfare of themselves and the interests they represent at heart will not be slow in deciding against a movement untried, revolutionary in character and with nothing in view but chaos and destruction. Let our objects in life be based upon the highest ideals.

William Tyler Page has written a creed that will make an appropriate ending to this efficiency installment. It reads:—

I believe in the United States of America as a government of the people, by the people, for the people; whose just powers are derived from the consent of the governed; a democracy in a republic; a sovereign Nation of many sovereign States; a perfect union, one and inseparable; established upon those principles of freedom, equality and justice.

## International Linemen.

Knowing that their friends in the U. S. A. will be interested in following up their fortunes abroad, the boys in the Third Section, Company E, of the 403rd Telegraph Battalion, have sent in to the *Telephone Review,* New York, a little article about themselves, which in part, reads:

"Hayange, Lorraine.

"We—that is, the Third Section—have nicknamed ourselves 'McDowell's Flying Section,' and to say the least, we are trying to live up to the name.

"Since being in France our company has been a factor in building a line from Paris, which goes to Chaumont, Joinville, St. Dizier, Bar le Duc, Suilly, Verdun, and connects with a German lead between Verdun and Briey, and we have taken sections and built lines between these various places, varying in length from five to twenty-five miles.

"We claim that we are international linemen, having worked on French, German, and American lines while in France, and having, in the space of six months, accomplished and done more than any telegraph batallion in France.

"Having completed a section between Bar le Duc and Suilly, we moved behind the first army from Verdun toward Briey, and built a line from Verdun which connects with a German line north of Etain. We dug holes in 'No Man's Land,' and strung wire over barbed-wire entanglements along sides of camouflaged roads that had previously been occupied by the retreating Huns. We were the first telegraph battalion to be in this sector and we were selected for this particular piece of work because the Germans were retreating so fast that it took expert men to maintain lines of communication with the swift advance of the troops ahead, and those to the rear."

MR. JUDGE H. OSWALD, of Pasacao, P. I., writes: "I do not know what I would do without TELEGRAPH AND TELEPHONE AGE in this lonesome burg. Your action in renewing my subscription has my heartfelt thanks."

## Awards by the Franklin Institute.

The following awards are made by, or on the recommendation of, The Franklin Institute:

THE FRANKLIN MEDAL (Gold Medal and Diploma).—This medal is awarded annually from the Franklin Medal Fund, founded January 1, 1914, by Samuel Insull, Esq., to those workers in physical science or technology, without regard to country, whose efforts, in the opinion of the institute, acting through its Committee on Science and the Arts, have done most to advance a knowledge of physical science or its applications.

THE ELLIOTT CRESSON MEDAL (Gold Medal and Diploma).—This medal is awarded for discovery or original research, adding to the sum of human knowledge; irrespective of commercial value; leading and practical utilizations of discovery; and invention, methods or products embodying substantial elements of leadership in their respective classes, or unusual skill or perfection in workmanship.

THE HOWARD N. POTTS MEDAL (Gold Medal and Diploma).—This medal is awarded for distinguished work in science or the arts; important development of previous basic discoveries; inventions or products of superior excellence or utilizing important principles; and for papers of especial merit that have been presented to the institute and published in its *Journal.*

THE EDWARD LONGSTREET MEDAL OF MERIT (Silver Medal and Diploma).—This medal, with a money premium when the accumulated interest of the fund permits, is awarded for meritorious work in science or the arts; including papers relating to such subjects originally read before the institute, and papers presented to the institute and published in its *Journal.* In the event of an accumulation of the fund for medals beyond the sum of one hundred dollars, it is competent for the Committee on Science and the Arts to offer from such surplus a money premium for some special work on any mechanical or scientific subject that is considered of sufficient importance, or for meritorious papers presented to the Institute and published in its *Journal.*

THE CERTIFICATE OF MERIT.—A certificate of merit is awarded to persons adjudged worthy thereof for their inventions, discoveries or productions.

THE JOHN SCOTT LEGACY MEDAL AND PREMIUM (Bronze Medal, Diploma, and Premium of $20.00).—In addition to the foregoing awards by the institute, the board of directors of City Trusts of the city of Philadelphia awards this medal and premium upon the recommendation of the institute in accordance with the terms of the deed of gift restricting it "to ingenious men and women who make useful inventions."

THE BOYDEN PREMIUM.—Uriah A. Boyden, of Boston, Mass., has deposited with the Franklin Institute the sum of one thousand dollars, to be awarded as premium to "any resident of North America who shall determine by experiment whether all rays of light, and other physical rays, are or are not transmitted with the same velocity."

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## THE TELEPHONE.

COLONEL JOHN J. CARTY, chief engineer of the American Telephone and Telegraph Company, New York, recently had conferred on him the distinguished service medal by General Pershing at Chaumont, France.

COL. W. T. GENTRY, president of the Southern Bell and Cumberland telephone and telegraph companies, will retire from office and from business activities on April 14, his 65th birthday, after a career of 46 years in the telephone and allied industries.

J. EPPS BROWN, first vice-president of the Southern Bell and Cumberland companies, will succeed Col. Gentry. .

J. M. B. HOXSEY, second vice-president and treasurer, will become first vice-president and treasurer.

GEORGE J. YUNDT, chief engineer, will become second vice-president and will assume the operating duties at present performed by Mr. Brown.

### Telephone Companies Returned to Owners.

An order issued by the Postmaster General on April 9, grants almost complete freedom from federal control to class D telephone companies. This class includes about eight thousand of the smaller companies throughout the country which do not maintain trunk line service, and whose annual gross revenues do not exceed $10,000.

B. B. WAGNER, American Telephone and Telegraph Company, Cincinnati, Ohio, in renewing his subscription for another year writes: "I wish to say that I do not want to be, without the AGE, as it is a mighty good magazine for the student or experienced man, and I always say a good word for the paper."

## INDUSTRIAL.

### An Operator's Repeater.

Commercial telegraph companies and railroad telegraph departments frequently find it advantageous to install a repeater at an office where there is but one operator stationed. There is a natural hesitancy in installing repeaters where there is no expert supervision. The J.-C. Repeater, manufactured by the Jester-Cooper Company, Houston, Tex., meets these conditions admirably.

### Brach Company Changes Corporate Name.

The name of the L. S. Brach Supply Company, Newark, N. J. has been changed to L. S. Brach Manufacturing Company.

The Company manufactures high grade telegraph and railway signal equipment, also police and fire alarm signaling apparatus.

### Up to Date Morse Sounder.

The diaphragm attachment for telegraph main line relays, which takes the place of local battery operated sounders, met war conditions so well by conserving supplies that it has found a permanent place in railroad and commercial telegraph service.

The instrument is manufactured by the Railways Labor-Saving Device Company, Davenport, Iowa.

GEORGE WOLF has assumed the duties of sales manager of the Kellogg Switchboard and Supply Company, Chicago. Mr. Wolf has been a member of the Kellogg organization since 1910, and has been actively engaged in telephone engineering work continuously during the past twenty years.

O. F. CASSADY, railway sales engineer of the Kellogg Switchboard and Supply Company, recently made an extensive trip throughout the South Western states in the interests of the Kellogg Company.

The old wire chief says: "When it is pouring rain is no time to hunt for leaks. Be an early bird and hunt them out in the morning while the dew is still on the leaves and on cross-arms. Catch 'em when they are young and they won't grow up to plague you."


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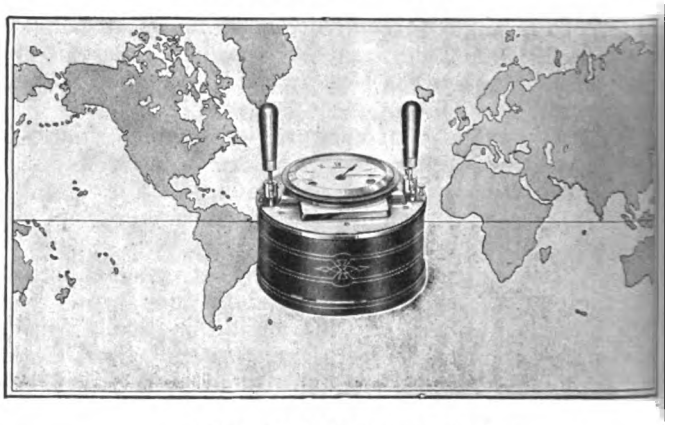

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## CANADIAN NOTES.

### Convention of Canadian Pacific Railway Officials.

The Canadian Pacific Railway Company recently held a business conference at Montreal of its officials in all departments. The conference opened in the Ritz-Carlton Hotel on Friday, March 21, and was followed by a banquet at the same hotel on Saturday night, at which about six hundred participated. A special train carrying the officials from the western lines, and a portion of those on eastern lines, proceeded to Quebec on March 23, and were entertained that evening by the Hotel Department at the Chateau Frontenac, Que., the special train arriving back in Montreal on Monday evening, this side trip being in charge of J. McMillan, manager of the telegraph department. On Tuesday the various departments held separate sessions when various papers regarding the particular branch of service of the department were read and discussed. The session of the telegraph department was attended by the following:

Chairman—J. McMillan, Manager of Telegraph, Montreal; W. J. Camp, Assistant Manager, Montreal; W. Marshall, Assistant Manager, Winnipeg; A. C. Fraser, Superintendent, St. John, N. B.; W. M. Thompson, Superintendent, Montreal; W. D. Neil, Superintendent, Toronto; D. H. Bowen, Superintendent, Sudbury; E. M. Payne, Superintendent, Winnipeg, D. Coons, Superintendent, Moose Jaw; D. L. Howard, Superintendent, Calgary; R. N. Young, Superintendent, Vancouver; J. Mitchell, Superintendent of Traffic, Montreal; H. S. Ingram, Inspector, Toronto; A. Malcolm, Inspector, Montreal; S. L. Elliott, Inspector, Montreal; R. Murray, Chief of Staff in the Manager's Office, Montreal; G. W. Bancroft, Telegraph Agent, Montreal.

At the combined session of all departments, attended by all of the railroad as well as the telegraph officials, the principal paper was delivered by J. McMillan, Manager of Telegraphs.

---

H. HULATT, manager of telegraphs, Grand Trunk, and Grand Trunk Pacific Telegraphs, of Montreal, was in New York on business during the first week of April.

---

W. J. ROONEY has resumed duty as division superintendent of telegraphs, of the Grank Trunk Pacific Telegraphs at Edmonton, Alberta.

---

### Jazz Morse.

The new operator in the big main office the first opportunity he had to send a dozen messages to the operator at his old home town was accused of sending Jazz Morse.

## IN THE BIG MAIN OFFICE.

BY R. M. TELSCHOW

Every telegraph office
Is full of Stars
And Wires and Things;
And bugs
Are a-buzzing all around.
Happy the boys
Who deliver the goods
In proportion to the quivers
Or shivers
Or whatever it is
That starts the signals
Along the copper trail.
A certain operator
Who should know better,
When the chief said:
" 'QC' can't break you,
Lift your relay,"
He almost lifted it
Off the table.
A Pennsylvania hamlet
Sent him No. 2;
No. 1 wasn't marked off.
So, he asked:
"Prithee, who got No. 1?"
"I don't remember,"
Morsed the Pennsy man,
"I sent it yesterday."
Speaking of live wires:
Podunk had one
'Till one day
It fell on a guy (wire)
And became grounded,
And when the local Star,
Tired of calling "G,"
He wrote a postal card
"Please answer local,"
And mailed it;
And next morning
After the lineman
Patched it
He gave "G" another call,
And, strange to say,
"G" answered promptly,
Which made him think:
"They got my card."
I thank you.

---

### Good Book on the Telephone.

"THE PRACTICAL TELEPHONE HANDBOOK AND GUIDE TO THE TELEPHONE EXCHANGE," by Joseph Poole, has been revised and brought up to date in a 1918 edition. This work contains 724 pages of detail information in regard to all phases of telephone operation. Particularly timely chapters are those describing trunk-line working; underground lines; line loading; multiplex telephony, and submarine telephone cables. The price of the book is $5.00.

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## OBITUARY.

C. R. VESTAL, SR., aged sixty-five years, died at Memphis, Tenn., on March 16. For fifty-one years he was identified at various times with every branch of the telegraph service, and worked for almost every company. Mr. Vestal was the first Associated Press operator in Chicago to work in a newspaper office over a loop. C. R. Vestal, Jr., night chief operator of the Memphis Western Union office, is a son of Mr. Vestal.

J. W. FREELAND, the well known former old-time telegrapher and a member of the United States Military Telegraph Corps during the Civil War, and for many years a resident of Marion, Ohio, died at his home on March 27. Mr. Freeland was a frequent attendant at the reunions of the Old Timers and Military Telegraphers, usually accompanied by his wife who survives him.

ROBERT BROWN, aged ninety years, an old time constructor of telegraph lines, who retired many years ago from active service, died in Brooklyn, N. Y., March 30. Mr. Brown constructed most of the lines for the Gold and Stock Telegraph Company in the early seventies both in New York City and in other Atlantic coast cities.

WILLIAM C. CARSWELL, aged 63 years, for seventeen years manager of the Western Union Telegraph Company, Topeka, Kansas, died on March 8th, after a week's illness of pneumonia. Mr. Carswell was an extremely popular man, taking great interests in all things civic. He is survived by a wife and five children.

S. K. RUPLEY, aged 77 years, died of apoplexy at Poughkeepsie, New York, on April 2nd. During the civil war he was a member of the United States Military Telegraph Corps. In 1865, he was appointed superintendent of telegraph of the Hudson River R. R. and manager of the Western Union Telegraph Company at Poughkeepsie, New York, and in 1882 he had entire supervision of the New York Central System from New York to Buffalo. He retired from active service several years ago.

GEORGE G. HADLEY, aged seventy years, formerly in the telegraph service at Toledo but for many years past in another line of business at Kendalville, Ind., died on March 17.

D. B. KEELER, formerly superintendent of telegraph of the Fort Worth and Denver Railroad, with headquarters at Fort Worth, Texas, died at that place on February 2.

## Ownership Statement.

Statement of the ownership, management, circulation, etc, required by the Act of Congress, of August 24, 1912, of TELEGRAPH AND TELEPHONE AGE, published 1st and 16th days of each month at New York, N. Y., for April 1, 1919.

State of New York, } ss.
County of New York, }

Before me, a notary public in and for the State and county aforesaid, personally appeared Donald McNicol, who, having been duly sworn according to law, deposes and says that he is editor of TELEGRAPH AND TELEPHONE AGE and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in Section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:
Publisher, John B. Taltavall, 253 Broadway, New York.
Editor, Donald McNicol, 253 Broadway, New York.
Managing Editor, none.
Business Managers, none.

2. That the owners are:
John B. Taltavall, 253 Broadway, New York; Donald McNicol, 253 Broadway, New York.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent. or more of total amount of bonds, mortgages, or other securities are:
None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds or other securities than as so stated by him.

DONALD MCNICOL, Editor.

Sworn to and subscribed before me this 21st day of March, 1919.

[SEAL] J. R. FRITH.

(My commission expires March 30, 1920.)
Notary Public, Kings County, No. 50.
Certificate filed in N. Y. County, No. 122.

The old wire chief says: "Did you ever know of a large telegraph office without at least one healthy feud? I don't and I have worked in twelve of the best of them. It's nature. If it proves anything it is that men are human beings and not bicycles."

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# Telegraph and Telephone Age

No. 9 NEW YORK, MAY 1, 1919. Thirty-seventh Year

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BACK NUMBERS of this journal three or more months old will be charged for at the rate of 25 cents per copy.

NEW YORK, MAY 1, 1919.

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### Wanted—New Worlds to Conquer.

Mr. Marconi and Mr. Tesla each has recently directed an inquiring eye into space, toward other worlds than ours. Professionally their interest is in the possibilities of communication with possible inhabitants of neighbor globes; it may also be that these men of a scientific turn of mind realize that the most desirable solution of the present human social problems would be to discover new worlds to conquer.

Heretofore in the history of our world when civilization advanced to a point where civilization was no longer bearable, some Eric the Red, Columbus, or Livingstone, broke a trail into other lands—other worlds, and opened the gates of opportunity for the oppressed, the ambitious, the brave, the venturesome and the malcontent.

The present world difficulties, apparently requiring a League of Nations, signify that our globe has been entirely parceled out, and that those who do not think they are oppressed, who are not venturesome, and who are not malcontents must either absorb or assimilate the bold spirits or be destroyed by them.

For several years past the processes of assimilation have been fostered in many ways, but the results so far attained have not been in proportion to the desires of those who wish to live in peace and happiness.

Andrew Jackson once stated that the best citizen he knew was a man who became rich by minding his own business. That was during the days of the "live and let live" period; a period that was followed by the "live and help live" period. The live and help live program, while it provides many opportunities for those who do the helping, requires too little in the way of co-operation and has the disadvantage that the number of those desiring help steadily increases.

James Gilbert White, in a speech recently before a delegation of Filipinos and Americano-Filipinos, in New York, said:

"To my mind, real freedom or freedom that is worth while involves not merely lip service, or the right to sing a different national hymn from that sung by other nations or other free peoples, but it involves, on the part of every man, the freedom to work out his own individual existence along lines which are established and easily interpreted; which gives protection to his home, his wife and his children; which gives to his children not only religious freedom, but the right to accomplish as much in the way of intellectual and material development as their capacity and their industry will permit them to accomplish, and that and the other items contributing to real independence can be accomplished only under stable and permanently stable conditions."

Here we have in few words an expression of opinion which reflects the views of thousands of men who have by honest plodding worked their way from small beginnings to honorable and responsible positions.

Many of the most unselfish and altruistic plans for social betterment which have been made, failed because those supposed to be benefited were looked upon in a group or mass sense. As an evidence of these failures it has been pointed out by Dr. Frank E. Vincent, president of the Rockefeller Foundation, in a speech before the National Housing Association conference that company-owned towns are a failure because the centers are unpopular, regardless of their attractiveness. He stated further that the average American resents being told what he must do.

If Mr. Marconi or Mr. Tesla can establish a bridle path to some new world which needs civilizing, the white man may once more take up his burden.

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# CURRENT EVENTS

## EXECUTIVE OFFICE ANNOUNCEMENTS, PERSONAL MENTION, APPOINTMENTS

### PERSONAL.

W. H. FLANN, superintendent of telegraph, Standard Oil Company, Oil City, Pa., was in New York recently for several days making preliminary arrangements for moving, in the near future, the company's telegraph department from No. 26 Broadway, New York, into new quarters at No. 18 Broadway. The move has been made necessary owing to overcrowded conditions at No. 26 Broadway.

W. J. LLOYD, late general manager of the Western Union Telegraph Company, Denver, Colo., and who has lived during the past winter at Bayou La Batre, Ala., will return to Denver about May 10.

WALTER W. SOERGEL has been appointed division traffic chief of the Associated Press, Central Division, with headquarters at Chicago.

E. FRANK WILSON has been appointed division traffic chief of the Western Division of the Associated Press, San Francisco.

Edgar T. Wolford has been appointed division traffic chief of Southern Division, Associated Press, Washington, D. C.

### POSTAL TELEGRAPH-CABLE COMPANY.

CHARLES P. BRUCH, general manager of the Postal Telegraph System has sent out the following notice to all offices:

"By direction of Postmaster General Burleson the present Postal Telegraph Employees' Association plan is continued in effect. A committee consisting of Dr. A. N. Holcombe, of Harvard University; Charles P. Bruch, general manager Postal Telegraph System; H. G. Funk, Morse operator, main office New York; Mrs. Edna Hammond, operator main office New York; R. L. Stephens, city foreman line department, New York; Miss Anna M. Cusack, auditing department, New York, and W. S. Ryan, Postoffice Department, Washington, D. C., is hereby appointed and directed to study the pension and benefit plans now in force by this system and other corporations, both wire and industrial, and to report as promptly as possible for the consideration of the Postmaster General their recommendations covering a pension and benefit plan for the benefit of the executives and employees of the Postal Telegraph System."

H. SCRIVENS, superintendent, Pittsburg, Pa., was a New York visitor during the Easter holidays.

J. F. SKIRROW, associate electrical engineer, New York, has been in the South during the past week visiting several of the company's offices.

JOHN J. WHALEN, manager of the New York main office, has returned from a trip which took him to most of the large offices in the South and West.

MANAGERS APPOINTED: A. S. Wood, Houghton, Mich.; C. T. Moore, Columbus, Ga.; H. S. Pierce, Evansville, Ind.; L. A. Dobrowolski, Hot Springs, Ark.; A. M. Howard, Hudson, N. Y., and Lester Bruce, Baton Rouge, La.

W. H. HILL has been appointed division cashier of the Southern Division, Atlanta, Ga.

G. M. CORREO has been appointed cashier of the Denver, Col., office, vice G. E. Arnold, resigned.

THE COMPANY'S OFFICES at Center Hill, Fla., and Fulton, Ala., have been reopened.

### Death of Welcome I. Capen.

Welcome I. Capen, sixty-five years of age, vice-president in charge of construction of the Postal Telegraph-Cable Company, died at his home in Mount Vernon, N. Y., April 16. He had been in poor health during the past two months.

Mr. Capen began his telegraph career as telegraph messenger in his native town, Brattleboro, Vt., with the Vermont, Boston and Montreal Telegraph Company, later becoming an operator with that company. He subsequently served as manager and wire chief with several of the telegraph companies which were in existence in the early 80's. When the Postal Telegraph-Cable Company was organized in 1885, Mr. Capen was appointed manager for the company at Cincinnati, Ohio, where he was, in 1890, named as the superintendent, being the first official appointed in the western division. In 1906 he was advanced to the general superintendency of the western division with headquarters at Chicago. In 1909 he was brought to New York as general superintendent of plant for the entire system, and in 1912 was appointed vice-president in charge of construction, which position he held at the time of his death.

Interment was at Woodlawn Cemetery, New York, Saturday afternoon, April 19, the honorary

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pallbearers were: Clarence H. Mackay, Charles P. Bruch, Charles C. Adams, George Clapperton, Edward Reynolds, E. C. Platt, F. B. Gerrard, M. M. Davis, M. W. Blackmar and R. Gould. Mr. Capen is survived by his wife and a son, Roger I. Capen.

### A. F. Adams.

A. F. Adams, representing the Postmaster General in the management of the Postal Telegraph-Cable Company, New York, is the executive head of the independent telephone companies operating in Missouri, Kansas, Illinois and Texas, with headquarters at Kansas City, Mo.

Mr. Adams began his telephone career in Waushara, Wis., early in 1899, when he was eighteen years of age. He was "central," bill collector, extra lineman and "trouble shooter" in the small plant. He graduated to the field about Superior and the ore section of Wisconsin early. He entered the Kansas City district about 1903.

At Joplin he became associated with Theodore Gary in 1904 and assisted in the development of Mr. Gary's projects in Kansas, Missouri, Texas and Illinois, and when the Gary interests were incorporated into the Theodore Gary Investment Company, in 1907, he was made vice-president. When the Kansas City Home Telephone Company was acquired, in 1912, he became its indirect manager and moved to Kansas City with the Gary Investment Company. A reorganization in 1918 resulted in Mr. Adams being made president of all the telephone companies owned by these interests, including the Kansas City Home Company. In addition to his connection with the Gary interests, Mr. Adams has been identified for many years with the United States Telephone Association, as a director and member of the executive committee.

JOINED GARY IN 1904.

When the proposed merger began to take form, all interests proposed Mr. Adams to head the new holding corporation. Although one of the four members of the national operating board in charge of telephone companies, a war-time board, he was active in the preliminary steps toward the merger. In Washington, where he spent most of his time, he obtained the consent of the government to the merger and has been active in that direction ever since. Recently on formation of the holding company, Mr. Adams was named president.

Mr. Adams will retain the leadership of the company created to merge the Bell and the Home companies. While the new federal appointment announced by Mr. Burleson is absolute, Mr. Adams regards it as temporary and expects to be relieved when the telegraph companies are released from government control. Meantime, he will remain as president of the Home Telephone Company and divide office time between Kansas City and New York.

Mrs. Adams and their two children will remain in Kansas City.

## WESTERN UNION TELEGRAPH COMPANY.

NEWCOMB CARLTON, federal director of cables, New York, is issuing daily for the press a bulletin on the condition of cable service to countries with which Americans principally do business.

LESTER ROTH, assistant auditor, New York, has resigned to enter the service of Thompson and Clark, engineering accountants.

W. McD. MILNE, division auditor of the Lake Division, Chicago, has arrived in New York to take up his new duties as assistant general auditor.

### Farewell Dinner at Chicago to W. McD. Milne.

W. McD. Milne, who was recently promoted from the Division Auditorship of the Lake Division, Western Union Telegraph Company, Chicago, to the position of Assistant General Auditor with headquarters at New York, was the guest of honor at a farewell dinner tendered to him by friends and associates at the Auditorium Hotel, Chicago, Tuesday, April 8th.

The dinner was a duplication of the many successful affairs of a similar nature, staged by the telegraph folk of the Windy City in the past few years in honor of favorite sons summoned to higher posts and new conquests in other fields. A well balanced program of musical numbers, snappy addresses, and vaudeville stunts, was provided under the competent direction of the master of ceremonies, Mr. A. C. Cronkhite, assisted by Messrs. H. Brown, S. J. Friel, and C. J. Eldridge.

The following were present:

C. H. Gaunt, J. P. Edwards, M. B. Wyrick, G. D. Hood, Dr. Milligen, G. P. Friel, A. J. Richards, F. G. Strey, G. R. Topham, F. J. Weaver, G. I. Armstern, J. A. Morrison, J. A. Sweeney, J. Fronche, D. N. Williams, W. W. Drew, G. E. Palmer, C. D. McDermet, E. W. Springer, H. Brown, A. A. Montgomery, T. O. Haebich, L. H. Schuyler, G. H. Bell, J. H. Norton, W. D. Dolan, T. Frost, O. F. Matson, E. W. Groner, S. J. Friel, E. J. Murphy, G. E. Sharp, W. W. Watt, C. W. Askelof, A. Young, J. F. Morgan, A. H. Sprague, C. J. Eldridge, M. D. Combs, E. Parsons, J. H. Pendry, Jas. N. Armstrong, J. W. Konigsmark, M. J. Duggan, Jay R. Page, H. C. Schaefer W. I. Lake, R. C. Walter, W. Blake, H. Hadason, E. J. Zander, J. Kujawa, E. C. Zeisel, F. D. Bermke, A. L. Buchanan, C. O. Blandin, Jas. N. Lawrence, A. C. Cronkhite, H. C. Chace, E. C. Schlicht, M. Christofferson, and J. Tousek, the latter from New York.

F. C. COLE, commercial superintendent, Seattle, and C. F. Newsom, division commercial agent, paid an official visit to the Spokane, Wash., office, recently.

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### Western Union Gathering at New Haven.

Eighty Western Union managers, chief operators, cashiers, telephone recorders and clerks held a get-together meeting at the Hotel Garde, New Haven, Conn., April 11. After the business conference a social entertainment and dance was given the visitors.

### Boston Western Union.

H. T. JONES, assistant chief operator in charge of multiplex, attached to the army radio service during the war, and who has been honorably discharged by the government, has resumed his position in this office.

THE RECENT ACTIVITY in the stock market caused a large increase in telegraph traffic from the New York Stock and Cotton exchanges, and the Chicago Board of Trade. In this office the New York stocks and bond wires are covered by Misses M. Lynch and A. E. Flood, alternating. On the cotton and grain circuit, Wallace J. Brown keeps up with the business. These three operators copy by pen from the fastest "bug" senders in the country.

PHILIP ROSENBAND operates the New York stock ticker keyboard and keeps the Morse senders busy supplying him with copy.

THE C. N. D. ORGANIZATION includes R. F. Hawley, J. F. Sullivan, J. W. McCarthy and Misses Jennie Gaddes, S. E. Whitaker and Ellen Coughlin. T. J. Young is the assistant chief operator in charge.

JOSEPH P. HAYES, national president of the Association of Western Union Employees, recently addressed a meeting of the Boston members. Mr. Hayes' address, with accompanying reports from other sections of the country, was favorably received. The meeting was addressed also by Park F. Harrington, division vice-president; J. F. Madigan, president of the Boston traffic local, and John F. Malloy, president of the Boston commercial local. During Mr. Hayes' visit a dinner was given him at the Quincy House.

A LOCAL COMMITTEE consisting of F. X. McVarish, Edward Smullen and J. H. Fahey of the Morse department, and Misses Agnes Green, multiplex, and Rebecca Leary, telephone, has in hand the undertaking of arranging for a musicale and dance to be given by the Boston members of the association in the near future.

### Messenger Boys' Entertainment.

Washington Irving High School, New York, was on April 9, the scene of a minstrel show and entertainment, the performers being messenger boys employed in the service of the Western Union Telegraph Company, Metropolitan Division.

The audience consisted of a large attendance of messenger boys, their relatives and friends. There was present also a number of officials of the company who voiced enthusiastic approval of the clever work of the boys.

W. H. J. Euston acted as interlocutor. The blackface comedians were: J. Schreiber, S. Meltzer, A. Epstein and M. Masnowitz; and the soloists: A. Becher, J. Tennenbaum, M. Nocero and E. M. Looney.

The vaudeville entertainment was given by Marshall and Hummel in a comedy act; M. Sadewitz in piano classics, and Will Roth in pianologue numbers.

J. F. Nathan, commercial general superintendent, delivered a short address in which he told of plans for the formation of a messengers' baseball league in Greater New York and of other activities of interest to the boys.

In closing the evening's entertainment J. W. Gaffey from Boston delivered the always interesting "Story of the Telegraph."

J. T. Carberry, district commercial agent, New York, took an active part in arranging for the entertainment.

### Dot and Dash Club to Give Dinner.

At a meeting of the Board of Governors of the Dot and Dash Club, held recently in Philadelphia, Alfred G. Strickland, wire chief for the American Telephone and Telegraph Company, was elected chairman. At this meeting fifteen new members were elected. Plans were made for an entertainment and dinner to be given on May 24.

Charles E. Bagley, superintendent of the Postal Telegraph-Cable Company is president, and R. C. Murray, wire chief, Western Union Telegraph Company, secretary of the club.

### Pacific Coast Notes.

POSTAL TELEGRAPH-CABLE COMPANY.

Elmer Cox, late chief operator of San Francisco office is now in the service of the American Telephone and Telegraph Company, San Francisco.

Maurice O'Neill is acting chief operator; George W. Parsons, acting late night chief operator, and Don. H. Townsend, acting night chief operator of the Postal's main office, San Francisco. Frank Arnsberger is day wire chief; G. C. Woodward, assistant night chief operator; C. O. Willette, assistant to the late night chief operator.

The Morse experts operating the overland circuits in San Francisco are: M. J. Wolinsky, J. M. Furr, C. G. House, E. S. Ridgeway, H. Tompkins, F. F. Grogan, Archie Rainey, E. J. Coney, E. R. Zimmerman, C. C. Hanes, L. G. LeCompte, E. O. LeChasseur, R. D. Thomson, J. Ufford, H. Bradbury, R. P. Klock. The Seattle circuit is operated by Miss E. Arding, Roy L. Nichols and Tip O'Neill; Los Angeles, P. C. O'Connor and A. S. Kimes.

Mrs. E. A. Rainey is chief operators' clerk and timekeeper. Other operators are: George Butler, N. Harrison, F. W. Seaman and J. W. Thompson.

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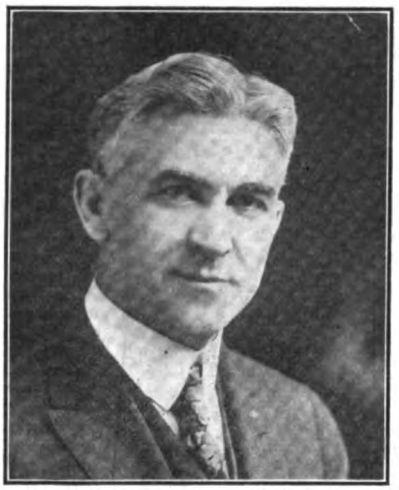
### W. T. Brown, Division Commercial Supervisor.

W. T. Brown, recently appointed division commercial supervisor on the staff of A. D. Bradley, general manager of the Western Union Telegraph Company's central division, with headquarters at Omaha, Neb., first entered the service of the Western Union in 1889 as a messenger at Salina, Kan. Graduating as an operator, he worked in that capacity for the Union Pacific and Santa Fe Railroads and for the Western Union at Kansas City until 1904 when he entered the service of the American Telephone and Telegraph Company, first as district manager at Joplin, Mo., and later as state manager of Arkansas. Returning to the Western Union at Kansas City in 1908 as quadruplex chief



W. T. BROWN

and later as manager at Muskogee, Okla., and chief clerk to the manager at Kansas City, Mr. Brown continued service with the Telegraph Company until 1911 when he accepted a position as deputy clerk of the Circuit Court of Kansas City. Resigning the latter position in 1916 to re-enter Western Union service as commercial agent at Kansas City, he advanced through various positions to that of district commercial manager in the second district of the old western division and later the third district of the new central division.

Mr. Brown is highly regarded by his associates and Mr. Bradley is no doubt fortunate in attaching to his staff one whose training and experience so well qualifies him for the work.

### New York Western Union.

ROSE ROGOFF, Morse operator employed in the way division and Harry Putterman, Commercial News Department operator, were married on April 17.

A DAUGHTER was born to O. H. Brown of the Commercial News Department, April 23.

## THE CABLE.

### Cable Staff Changes.

The following staff changes have taken place in the service of the Pacific Cable Board: L. H. Mullard, Fanning Island to Suva; C. R. Haines, Suva to Fanning Island; E. G. Ziems, Suva to Sydney; E. R. Saffery, Bamfield to Auckland; and A. F. Smith, Montreal to Bamfield.

In the service of the Western Telegraph Company the following staff transfers have taken place: A. G. Douglas, Santos to Pernambuco; A. G. Seymour, Montevideo to Rio de Janeiro; E. A. Lewis and J. Lindsay, Pernambuco to Rio de Janeiro; J. B. Blair and T. H. E. Lovelace, Rio de Janeiro to Valparaiso; C. W. Challis and J. O. Thornton, Rio de Janeiro to Pernambuco.

### Modifications in Cable Censorship.

The following announcement was made on April 17:

"The Navy Department, through the chief cable censor, has made important and far reaching modifications in the operation of the United States cable censorship. As a result of these relaxations persons in the United States or any of its possessions may now cable, without any interference whatsoever by United States censorship, to points in Central, South America and the West Indies, including Mexico and Cuba.

"For instance, cablegrams in private code are permitted from Chicago to Valparaiso, or from Havana to Honolulu, or from New York to Mexico City.

"The United States has also stopped censoring cablegrams to or from points within British, French or Italian territory, irrespective of the route or other terminus of such cablegrams, likewise cablegrams between all parts of the world and Central and South America are not censored by the United States, and in addition, cablegrams to and from the Far East, excepting only those to or from Vladivostock, are no longer subject to United States censorship.

"It is, however, to be noted that British, French and Italian censorships are still in operation, and the fact that the United States has stopped censoring certain cablegrams does not mean that such cablegrams will not be subjected to censorship by Great Britain, France or Italy, as the case may be.

"The United States will not censor a cablegram between Lima and Paris, but the French will, and such a cablegram will have to conform to the rules and regulations of French censorship, whereas a cablegram between Lima and New York is subject to no censorship whatever. Similarly, a cablegram from Mexico City to London, or through London, must conform to the British regulations, whereas a cablegram from Mexico City to Boston is subject to no restrictions.

"The British Government has not decided whether it will permit cablegrams in private code between the United States and South America to pass via London, but it is hoped that such cablegrams will be subjected to no interference in London and that both cable routes from the United States to South

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America may be equally free from censorship restrictions.

"The restoration of the right to use private code between United States territory and all points in the Far East (other than to or through Vladivostock) and the re-establishment of the same privilege with Central and South America, will prove highly beneficial to cable users and tend materially to hasten the resumption of normal trade. Prompt notification will be given of any modifications in the rules and regulations of British, French, or Italian censorships, whereby private code may be used on cablegrams to, from or through their respective territories.

"Cablegrams between United States territory and points in Europe, Africa and Asia Minor, which are not within British, French, or Italian territory, will be censored by the United States as formerly and the same restrictions and regulations will remain in force"

### Germans Lose Submarine Cables.

It is reported from Paris that the clause in the treaty of peace dealing with the ownership of the submarine cable lines formerly owned by the Germans, will place at the disposal of the allied governments fifteen cables.

The discussion on this question has been most interesting. It raises a point of sea law of an unusual nature, namely, whether the cutting of the cable and displacement of it could be compared to capture of a ship at sea. The draft of the articles of the peace treaty gives to Germany the right to repair at its own expense the German cables which have been cut but not used by the allies during the war, and to replace all sections of the line which have been displaced.

LIST OF CABLES TAKEN.

Consequently the following German cables will not be restored to their owners: Emden to Vigo, Emden to Brest, Emden to Teneriffe, Emden to the Azores (two cables), the Azores to New York (two cables), Teneriffe to Monrovia, Monrovia to Pernambuco, Lome to Duala, Constantinople to Constanza, Tsingtau to Shanghai, Yap to Shanghai, Yap to Guam, Yap to Monado (Celebes), and Monrovia to Lome.

It is understood that the interesting recommendation has been made that in the event of the League of Nations receiving general control over the peace treaty, the execution of the financial terms shall be supervised by the financial section of the league. This financial section will have as its duties to advise the league on any question referred to it on all subjects, including naval and military methods. In principle the reference to the financial section will be compulsory, but in exceptional cases the league must have the discretion to act without obtaining the financial section's advice.

"We know now that there is no such thing as Americanism, unless Americanism is in our souls." —Franklin K. Lane.

## RADIO TELEGRAPHY.

MARCONI NOTES.

E. J. NALLY, vice-president and general manager, has returned from Chicago where he was called by the illness of Mrs. Nally, who is now out of danger.

F. H. KROGER, late of the International Signal Company, has entered the Marconi service as assistant chief engineer.

THE OFFICES of the Wireless Press have been removed from 25 Elm Street to the Woolworth Building.

DAVID SARNOFF, commercial manager, has returned from Cuba where he went on business of the company.

L. C. EVERETT, assistant engineer, who has been in South America some weeks on company business, is en route from Buenos Aires to New York via Panama.

BENJAMIN S. READ of St. Louis, Mo., operating vice-president of the Southwestern Bell Telephone Company, has been elected president of the Mountain States Telephone and Telegraph Company, with headquarters in Denver, Colo., succeeding E. B. Field, deceased.

FRANK E. BOHN, for several years assistant general manager of the Home Telephone and Telegraph Company of Fort Wayne, Ind., has been appointed general manager of the same company.

### Marconi International Marine Communication Company, Ltd.

At an extraordinary meeting called in London, April 16, a resolution was submitted increasing the capital stock by the creation of 900,000 new shares of £1 each. This makes the capital £1,500,000. The directors wish to provide for probable requirements consequent upon the growth of the business and contemplated capital outlays. It is proposed to offer to the shareholders 600,000 shares at par in proportion to their holdings. The remaining 300,000 shares will be for issue at some future time. The directors contemplate that at the ordinary general meeting which will be subsequent to the issue they will be in a position to recommend upon the then issued capital the payment of the same dividend as was recommended by them and approved by shareholders at the last ordinary general meeting.

### Amateur Radio Ban Lifted.

Announcement has been made by Acting Secretary of War Roosevelt that, effective April 15, all restrictions upon the use of radio receiving stations, other than those used for commercial traffic are abrogated. The order applies to amateur, technical, experimental and other stations. The restrictions on transmitting stations of all types will remain in force for the present and until further notice.

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# THE PROGRESS OF GOVERNMENT CONTROL OF TELEGRAPHS

The events of the week relating to government control of the telegraph, telephone and cable systems have covered a wide range of activities.

Following the twenty per cent. advance in telegraph rates, as announced in our April 16 issue, the officers of the Commercial Telegraphers' Union of America, which is now conducting a strike vote, charged that employees have not received advances in wages commensurate with the increased rates.

"The owners of the systems," said a statement issued by the Postmaster General, "do not benefit in any way from the increased rates collected for either telegraph or telephone service.

"The increase of wages allowed employees of the wire systems under government control aggregate for telegraph and telephone combined $34,000,000 per annum, while the total rate increases made or contemplated, amount to less than $40,000,000. It is necessary to provide for increased cost of apparatus, material and supplies as well as for the wage increase, and the increase of rates is not as great, as applied to either service, as would have been unavoidable under private control."

As we go to press the ballots of the memebrs of the Commercial Telegraphers' Union are being counted in Chicago to decide whether or not the telegraphers shall strike as a protest against Postmaster General Burleson's methods of wire control.

### MR. BURLESON EXPLAINS.

In a communication dated April 12, Postmaster General Burleson has the following to say about the work of the wire administration:

"The Wire Board has at all times endeavored to be absolutely just and fair to all the employees of the wire service, the owners of the properties and the public. Since it has been in control the policies of the War Labor Board, approved by the President, have been strictly observed. Often during this period the question has arisen, shall those in temporary control of these wire properties permit themselves to be driven beyond the just principles embodied in these polices? Shall established governmental policies be abandoned or its powers surrendered to employees because of threatened strikes? To allow them this would be to concede the assumed right of employees serving the government to use the strike as a means of enforcing unjustified demands. No such concession has been or will be made. A public official can only rely on an enlightened public opinion for just conclusions as to his acts, and the unvarnished truth made known is the only means for creating this public opinion. This becomes quite difficult if not impossible when, through stealthy means, despicable intrigues and concealed malice, a systematic propaganda of misrepresentation for selfish purposes is inaugurated against him.

"It is manifest that there is a definitely organized propaganda to destroy the confidence of the congress and the public in the honesty and efficiency of the wire administration and the persons operating the wire systems. It is believed that it has for its real purpose another end not connected with the wire service. It is evidently being carried on as a result of specific instructions which might be quite illuminating if disclosed. It is characterized by a persistent practice of creating and falsifying news, misrepresentation of facts, appeals to prejudice, and an utter disregard of the effect it may ultimately have on the welfare of the employees of the wire systems or the public interest if it should succeed in creating misunderstanding, distrust and disloyalty on the part of the thousands of hard-working employees handling the wire service. It ignores the incontestable fact that the interest of the companies, employees and the public is identical, that neither can disregard the real interest of the other —that to get the best results there must be sincere, honest, co-operative effort on the part of all.

"I cannot believe it will succeed, but am determined that if such result should come it shall be through no fault of those in authority who are carrying on their shoulders the responsibility of conducting this service for the government."

### THE "WORLD" NEWS DESPATCH.

On Sunday night, April 20, the New York *World* submitted to the two telegraph companies a synopsis of a critical account of Mr. Burleson's career and conduct; the despatch being intended for telegraph transmission to fourteen other newspapers which have news arrangements with the *World*. The telegraph officials of both companies, in charge at the time, declined to accept the despatch for transmission over the government controlled wires. The despatch was printed in full in the *World* and has since reached many other papers throughout the country.

The incident caused a veritable storm of protest and criticism in all sections of the country. Subsequently it was stated by the Administration that the refusal to accept the despatch was upon the initiative of the operating officials of the telegraph companies on duty at the time the matter was offered for transmission.

### CABLES TO BE RETURNED.

On April 28, Postmaster General Burleson recommended to the President that the government turn the cable lines back to their owners not later than May 10. He will recommend that the telegraph and telephone wires be returned to their owners "as soon as legislation can be secured from Congress safeguarding the interest of the owners."

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# Transoceanic Radio Communication

## The "Barrage Receiver"

By E. F. W. Alexanderson, of the General Electric Company.

*(Abstract of a paper presented before the American Institute of Electrical Engineers, Lynn Section.)*

This system of radio communication differs in several respects from the other systems which have been used in transatlantic communication. These other systems are known as Marconi system, Poulsen system, Goldsmidt system and Slaby Arco system. In our system as now used, improvements have been made in each of the four stages in the transmission of a radio message which characterizes all systems of radio communications. These stages are; first, the generation of high frequency electric oscillations; second, the modulation of these oscillations into the dots and dashes of the telegraph code or modulation by the human voice; third, the radiation of the electric oscillations in the form of waves traveling with the velocity of light over the surface of the earth; fourth, the reception or detection of these waves by a suitable instrument. The oscillating currents are generated by a high frequency alternator, which delivers currents directly to the antenna of the same frequency as the radiated waves. One of the advantages of the alternator is its "pure wave," by the virtue of which messages sent by different radio stations (using a pure wave) do not interfere with each other. A familiar equivalent from telephone practice is the comparison between a modern balanced telephone line and the old, single wire telephone on which cross-talk from all the neighbors could be overheard. As a modulator of the electric oscillations is employed a new device which has become known as the "Magnetic Amplifier." Due to magnetic properties without moving parts, this device is so quick acting that it makes it possible to transmit telegraph messages at the rate of several hundred words a minute, and also to amplify the modulation of a telephone current into oscillations powerful enough to carry the human voice across the ocean. In all the radio systems the radiator is called the antenna. As a device for transforming energy the antenna used up to the present is very inefficient, the ratio between useful energy radiated and energy consumed being from 5 to 10 per cent. The antenna used at the New Brunswick, N. J., station is of a new type which we have designated as the multiple tuned antenna, by which is practicable an efficiency from 20 to 50 per cent.

An improvement in the technique of receiving radio messages which was developed for military reasons and has become known as the "barrage receiver" promises to play an important part in commercial communication. The nature of the problem can perhaps be best explained by an equivalent in sound waves; it might be desirable to have an ear which could be so adjusted that a person could stand close to a steam whistle and listen to words spoken from a distance of several hundred feet. Distances are only relative, and a steam whistle located in Germany might make such a noise that it would completely drown out the sound of the voice calling from America. Such a contingency was seriously feared, and to counteract the same the barrage receiver was developed. A demonstration was made three miles from the New Brunswick transmitting station, and it was shown that the overwhelming intensity of the New Brunswick signal could be completely neutralized so that messages could be received from European stations as well as if the transmitting station were not operating. After this demonstratoin the barrage receiver was immediately adopted in the official receiving stations of the American and French governments. While the radiation of waves for offensive purposes will be prohibited by law in the future, the barrage receiver will be none the less important because it makes possible a multiplication of the number of radio messages that may cross each other without interfering.

### THE BARRAGE RECEIVER.

The barrage receiver is fundamentally a unidirectional receiver. The principle followed by the author in devising the barrage receiver was; first, that the antennas, or energy collectors should be aperiodic, because the balance of two tuned circuits is fundamentally very delicate and difficult to adjust for a perfect balance; second, that the balance should consist in neutralizing the electromotive forces in the aperiodic antennas before those electromotive forces have had a chance to create oscillating currents; and third, the two or more antennas should be of the same character. In other words, it is preferable to balance a magnetic exposure against another magnetic exposure, rather than against an electrostatic exposure.

The barrage receiver takes advantage of the geographic phase displacement in the wave as it travels over the surface of the earth.

In the first barrage receivers installed the antennas consist of two insulated wires laid on the ground a distance of two miles in each direction from the receiving station.

The barrage receiving set consists of a standard radio receiving set combined with a phase rotator set, the electrical connections of the latter being shown in the accompanying diagram.

The horizontal antennas to the left and right in

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the diagram are connected to earth through intensity couplers, the secondary windings being connected with the primary of the phase rotator in each case.

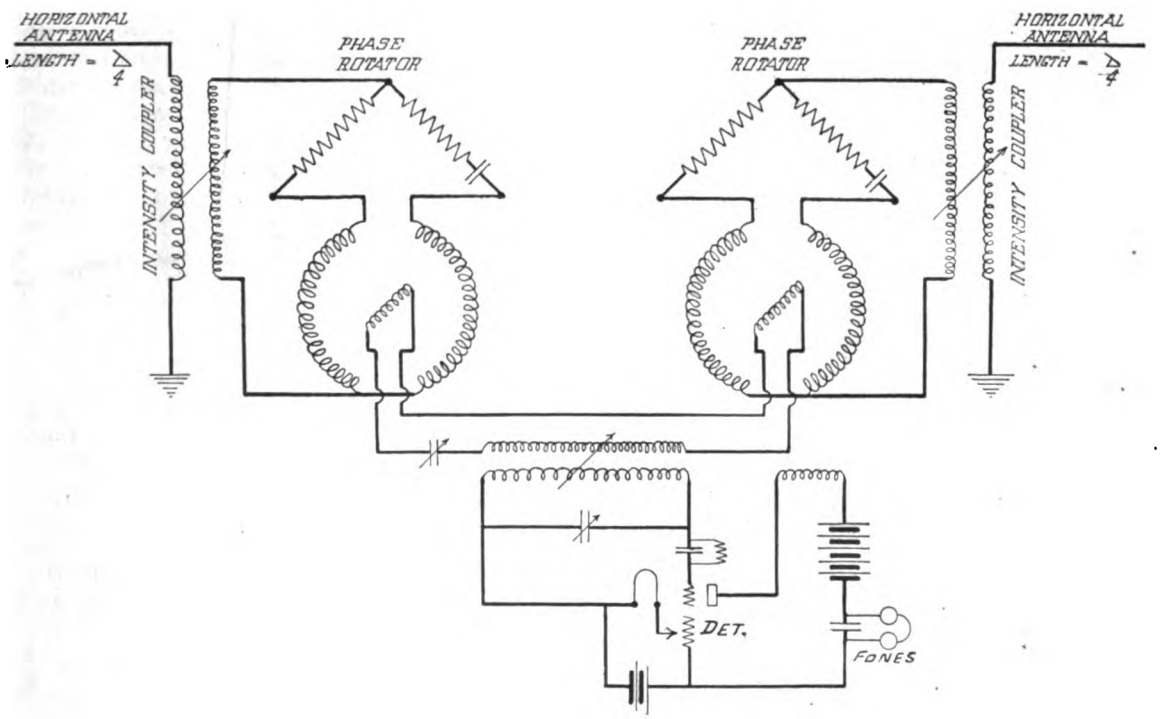
A single phase current introduced in the primary is split into quarter phase current which produces the equivalent of a rotating magnetic field inductively related to the secondary. By adjusting the position of the secondary coil, the electromotive force induced in it may be made to assume any desired phase relation to the primary voltage.

The receiving set proper, when used with the barrage receiver, has all the normal characteristics of a standard receiving set. A signal originating in any direction whatever may be neutralized by adjustment of the intensity couplers and phase rotators.

While the barrage receiver was worked out primarily to avoid interference in transoceanic communication, it may be found useful also for simultaneous sending and receiving from small shore stations or ship stations. It can be used not only to neutralize the transmitting station to which it belongs, but can neutralize interference from any other ship or shore station.

By the use of a double set of phase rotators, the barrage receiver may be used to neutralize two stations in different directions simultaneously, and this principle may be carried still further if desired.

Transoceanic radio communication up to the present time has been carried on by the telegraphic method, and there is no doubt that due to the possibility of high speed telegraphic transmission, that the bulk of the traffic will be carried in that manner. This, however, makes the subject of transoceanic radio telephony no less interesting. It has been demonstrated in the recent tests carried out at the New Brunswick radio station, that the new radio system which has been described is equally adapted for either telegraphy or telephony. Thus it was possible, by changing the control from the telegraph lines to the telephone lines from Washington, that Secretary Daniels, speaking through the telephone in his office, conveyed greetings to President Wilson on board the U. S. S. *George Washington,* at sea. Similarly, telephonic messages were sent to the President's ship on his return trip, and were received while the ship was at anchor in Brest harbor.




THEORETICAL CIRCUIT CONNECTIONS OF THE ALEXANDERSON RADIO "BARRAGE" RECEIVER. IN THE LOWER CENTER IS SHOWN THE AUDION DETECTOR AND RECEIVING TELEPHONES.

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# THE PRIVATE AUTOMATIC EXCHANGE, OR "P. A. X." AND ITS USE IN RAILWAY SERVICE

By J. H. Finley.

### WHAT IS A P. A. X.?

To define such a system to the uninitiated in Automatic terms, is quite a difficult problem, but to define it in terms of things every one of the readers do know and understand, is not difficult. Therefore, before entering on an automatic definition, let us use a standard manual definition, adapted to automatic, and compared to it step by step as we go along.

In the first place, the present perfected automatic telephone equipment is a direct outgrowth of the manual system and therefore bears in many respects a very close resemblance to it.

The "P. B. X.," or manual private branch exchange, consists of a small switchboard, varying in size from 25 line capacity to as many as 1000 or 1200 lines, in large institutions.

The ordinary type is so arranged that not more than seventeen cord circuits are available for an operator who may handle anything from 10 lines to 200, the number varying according to size of institution, rate of calling, urgency of attention, method of calling, and an almost infinite variety of causes, requiring as many different solutions.

The circuits used in a P. B. X. board are of several classes, divided into groups as line circuits, cord circuits and trunk circuits. The line circuit requires a line jack, a line lamp, lamp socket, and lamp cap, in the front of the board and a line relay and a cut-off relay in the rear of the board, or in the case of large boards, these relays mount on a relay rack some distance from the board, being connected by a cable.

The cord circuit of manual board is usually equipped with 2 cords, 2 plugs, 2 lamps, 2 lamp sockets, 2 lamp caps and ringing and listening key on the cord shelf, in front of the operator and mounted on the rear of the board is found a repeating coil or a retardation coil with 2 windings to feed battery to the cords and 2 supervisory relays to operate the lamps, these relays either bridged with a condenser or a non-inductive winding for talking.

Now a P. A. X. has similar parts to the above except those requiring manual operation, or in other words, the automatic equipment has everything but the girl—the human factor—and the parts to be used or observed by her.

In the manual boards, exist capacities of 25 lines to 1,200 or more; in automatic boards, exist capacities of 25 lines up. Unlimited P. A. X. boards, above 100 lines, are made up in multiples of one hundred.

In the manual boards, there is a limit of 17 cord circuits to 100 lines or less; in the automatic, there is a capacity of 10 or 20 connectors or automatic cord circuits to 100 lines or less. The number used varies as the service requires. It is to be noted that the automatic cord circuit or connector will handle on the average 20 per cent. more traffic or calls than the manual, due principally to the instantaneous disconnect, which is not possible on the average manual board, as the operator disconnects on signal and only as fast as the traffic will permit. In other words, the operator can handle only one pair of cords at a time, while the automatic may operate the whole 10 or 20 at the same time, especially on the disconnect.

In the manual line circuit, we have a line relay and a cut-off relay; in the automatic board, we have the line switch which is a line relay and a cut-off relay, carrying an arm on the armature to connect the line to the connector on automatic cord circuit, and in addition a master switch, for each 25-50 or 100 lines, depending on traffic and service desired, which automatically keeps these armature arms in front of a non-busy connector or cord circuit. There is no necessity for cords, lamps, lamp sockets, caps, etc., as there is no one to use the cords or to see the lamps if they light, and the subscriber is advised audibly whether the line is busy, or the called subscriber's bell rings. There is no need to flash the operator by moving the switch hook up and down, as there is no operator, and the first time the switch hook moves, the subscriber is ready to call again.

Similarly, the cord circuit in the P. B. X. has retardation coils, or repeating coils, etc. The P. A. X. employs relays and magnets. There is in the P. A. X. connector or cord circuit an operating relay and two slow acting relays, so arranged that the first operation operates the vertical magnet and steps up a pair of wipers or connecting springs to the desired tens' place, where these springs stay until started in on the units' number by another series of impulses, operating the rotary magnet which causes the arm carrying the wipers or contacts to move around to the desired number.

The impulses for operating the spring-carrying arm of the connector or automatic cord circuit, are obtained by a dial mounted on the telephone, which has ten holes in the moving part. As many impulses as indicated on the dial are delivered to the line and through the coils in the switchboard. For example, if you place the finger in hole number 4 and pull dial to stop and release, four impulses are sent through the operating relay in the switchboard.

When the process has proceeded to the point where the connecting springs are advanced to the number desired, one of two things occurs. Either the ringing relays pull up and send ringing current out to the desired subscriber's bell or the busy relay is operated, sending the busy-tone back to the

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calling subscriber. All of these operations occur much quicker than it can be told.

Now the above describes what the P. B. X. operator does when a calling subscriber, by raising the receiver from his switch hook, operates a line relay, lighting a lamp in front of operator. She plugs in the answering cord, which operates cut-off relay and puts out lamp. She then operates the answering key, asks subscriber for number, obtains it, tests line to determine if busy, unless line ends in front of her with no multiple, in which case she can see readily whether the line is busy or not. If not busy, she plugs into the jack associated with the called party's line and operates ringing key, thus operating the bell at the called party's telephone. If the line is busy, she so notifies the calling party.

Both of the foregoing descriptions cover the simplest kind of operation; that is, the non-multiple P. B. X. board and the less than 100 line P. A. X. board.

In comparing the life and maintenance charges of the two boards, care should be taken to consider all the facts. The life of a P. B. X. board depends on its operating parts and frame work, as also does the life of the P. A. X. board.

The P. B. X. equipment consists of cords, plugs, lamp, jacks, etc. subject to constant wear and requiring constant attention and repairs, and when certain parts wear to a certain limit, the whole has to be replaced.

The P. A. X. equipment consists of relays, wiring etc., mounted on an iron frame and having an iron cover. Nearly all parts have an unlimited life, but the few small parts that do wear are inexpensive and are replaced in regular maintenance.

The life of the P. A. X., therefore, is largely determined by obsolescence, rather than wear. There are some of these boards in use that have been working for twelve or fifteen years and are still giving good service.

The use of this equipment on railroads is one which has come into prominence in the past six years. One of the first P. A. X. boards in the United States, used exclusively for intercommunicating, in a railroad yard, shops, etc., was that installed at the Burnside shops of the Illinois Central Railroad. This installation was made in the interest of economy, as some extra service was required, 24 hours a day, but an operator type board would not prove in.

The telephones connected to this board were installed in the factory office, roundhouse, at stations in the yards, in the hospital and all other local points. Later, lines were extended to the general offices, about six miles away, and to some stations two or three miles further north; so, gradually, a system contemplated to be used in the office only, was extended eight or nine miles north, six or eight miles west, and several miles south of Burnside.

The savings made possible by this installation are not readily calculable, as they consist of savings in train delays, getting materials from stock quicker than by the old method; savings in case of accidents, by more quickly getting in touch with the hospital forces; savings in executives' time by settling things quickly.

The automatic telephone, in yard service, is used as follows: The telephones are mounted in wooden shelters or in iron boxes, at convenient positions in the yards, so located that they are easily accessible to the train crews. These crews complete one run and drop off the caboose or engine and open the nearest telephone box, call the dispatcher or yard master for further orders and in three minutes, are starting a new job. This saving on one road was sufficient to permit an entire crew's removal, representing a saving of $15,000.00 per year in operating.

The office telephone savings are less tangible, but just as effective, as people will use the telephone rather than walk if it is handy and does not involve a third party, like an operator.

# THE BALIZE TELEGRAPH LINE

**An Old Scrap in Which the Associated Press Won**

By E. H. Hogshead, New Orleans.

In the fall of the year 1866, a battle royal was staged between D. H. Craig, who launched a new press news service, and the New York Associated Press, whose service he sought to supplant. Edward Leloup, New Orleans agent of the Associated Press, had accepted the agency of the Craig service, leaving the Associated Press without a representative. James C. Hueston, a local telegraph operator, promptly applied for and obtained the vacant agency.

At this time there existed a contract between the Associated Press and the New Orleans Towboat Association under which the former operated the Balize telegraph line, the property of the latter, with the privilege of handling news and commercial business. This was the only telegraph line between New Orleans and the mouth of the Mississippi river, and it enjoyed a monopoly in reporting the arrival and departure of ocean-going vessels, a service that was vital to the newspapers of New Orleans and other interests. On the bond of the Associated Press under this contract were two sureties, Wm. H. C. King, of the *Times*, and Col. J. O. Nixon, of the *Crescent*. The line was connected with the office of the Associated Press, which had entire control of it.

Mr. Leloup had secured an agreement by a major-

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ity of the newspapers receiving the reports of the Associated Press including the *Times* and *Crescent,* to transfer their patronage to Craig. Hueston labored assiduously to retain them. Failing in this, he dealt them an unexpected blow. The Balize line was not a common carrier. He at once forbade the use of the wire by the opposition papers, thus cutting them off from their river news. As a counter-stroke the Craig interests undertook to have the wire cut out of the office of the Associated Press and transferred to their own agency. A written demand on Hueston to permit the cutting out of the wire, signed by Wm. H. C. King, J. O. Nixon, sureties, was presented by Mr. Leloup, who brought with him a lineman and tools. Hueston bluntly told Leloup he must "bring better papers or a stronger force." Then Messrs. King and Nixon called in person and strove by persuasion, argument, and finally by threats of prosecution, to move Hueston to comply with their demand. He blandly informed them that they could get possession of the wire when a court of competent jurisdiction should so order. He wrote: "I then turned to my desk to write up my morning reports and didn't look around to see how they got out."

King and Nixon at once employed counsel, while Hueston committed his defense to the ablest chancery lawyer in the city.

Thus matters stood until the end of five weeks, when the Craig service was discontinued, leaving the Associated Press in undisputed possession of the field.

What the result of the contest in other cities was the writer is not advised. Some years ago a lawyer in Washington, who claimed to have had an interest in the Craig venture, stated that the stoppage of that service was the result of a compromise and not lack of financial backing.

Hueston's admirable management of the Associated Press interests greatly impressed General Manager J. W. Simonton, who soon after promoted him to assistant general manager in New York. And to make the pay attractive—$50.00 a week—he agreed to pay $20.00 out of his own pocket to supplement the $30.00 allowed by the association. Later the Associated Press authorized the increase.

Mr. Leloup was the leading press news reporter in New Orleans during the Civil War. In later years he became successively the New Orleans manager for most of the new telegraph companies organized to compete with the Western Union. At one time he was a general superintendent. He also served the Western Union as manager at Cincinnati.

## INSULATION TEST FORMULA.
### Using Direct-Current Voltmeter.

By Albert Murray, Waterville, Ireland.

In Telegraph and Telephone Age of March 1, 1919, appeared an article by "Uncle George," dealing with voltmeter insulation tests, which in an elementary way covered the ground in a very clear manner, and it would seem that once the student grasps the subject in the way intended by the writer of the article referred to, that it would be of advantage to carry the subject a little further, to the end that the theory of the measurement might be better understood.

$$Current\ (in\ amperes) = \frac{Volts}{Resistance\ (in\ ohms)}$$

Let $v$ = E. M. F. of battery or dynamo,
$R$ = Resistance in ohms of the voltmeter,
$X$ = Insulation resistance,
$d$ = Deflection (in volts) of voltmeter.

Then $d$ will represent the difference in potential between the terminals of the voltmeter, or the number of volts absorbed by the voltmeter, and, if the battery resistance is negligible, this number of volts plus the volts available at the home terminal of the line will equal the total E. M. F. of the battery. Or, calling the volts at the start of the line $v_1$,

$$v_1 + d = v$$

Whence,

$$v_1 = v - d$$

Now, the current leaving the battery is:

$$Current = \frac{v}{R+X} \qquad [1]$$

Also,

$$Current = \frac{v-d}{X} \qquad [2]$$

Therefore, the quantities [1] and [2] to the right, are equal to each other, so that:

$$\frac{v}{R+X} = \frac{v-d}{X}$$

Cross-multiplying:

$$vX = vR + vX - dR - dX.$$

Canceling $vX$ on each side, since they neutralize each other, and, transposing the remaining quantity containing $X$ to the left-hand side:

$$dX = vR - dR$$

$$X = \frac{vR - dR}{d} = \left(\frac{v-d}{d}\right) R$$

Dividing the numerator by the denominator:

$$X = \left(\frac{v}{d} - 1\right) R$$

To bring to megohms divide by $10^6$. This is the *absolute* insulation. If the answer is desired in miles, or per mile, then multiply by the length of the line in miles.

This little description tells much the same story as that told by "Uncle George," but in a way which, if mastered thoroughly, will enable the student to better understand the theory of the test and to apply it to a wide range of electrical measurements.

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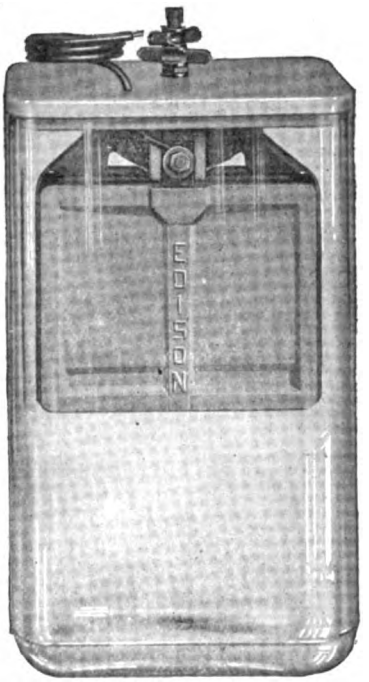
# FOR CLEAR TRANSMISSION

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## THE RAILROAD.

G. A. CELLAR, superintendent of telegraph, Pennsylvania Lines West of Pittsburg, and E. A. Chenery, superintendent of telegraph of the Missouri Pacific Railroad, St. Louis, Mo., were in New York, attending a conference of railroad officials, April 12.

### Memorial to the Memory of Frank Tremble.

Friends of Frank Tremble, late superintendent of telegraph of the Texas and Pacific Railway Company, Dallas, Tex., have formed an association to raise funds with which to erect a memorial to his memory that will endure for all time.

The organization committee is composed of G. C. Comstock, chief dispatcher; G. E. Booksh, circuit manager; C. W. Cooper, operator, all of the Texas and Pacific Railway Company, and T. H. Lowry, operator, Western Union Telegraph Company, Dallas.

The funds as collected are being deposited in the Dallas Trust and Savings Bank, Dallas, Tex., the bank acting as trustee of the memorial plans. The subscriptions will be closed June 30, 1919, after which a special committee consisting of Mrs. Frank Tremble, Miss Dorothy Tremble, and three others to be elected by a vote of the subscribers, will decide upon the form the memorial is to take.

Mr. Tremble's wide popularity among telegraph men, the country over, should result in a memorial fund being accumulated which will be a lasting tribute to a railroad telegraph official who over a long period of years retained the good will of a host of employees.

## ONEIDA CODE, FIRST EDITION, NEVER REVISED.

### Jim Ash Puts the Indian Sign on the Germans.

The story of how Jim Ash (Indian name unpronounceable), a big brave from the Oneida reservation in Wisconsin, assisted by two other Oneidas overcame the wire tapping schemes of the enemy, was told by George W. King of Iron River, Wis., who was attached to the 20th Engineers on the Alsace front in the terrific fighting in September, 1918.

In the most intense warfare, chiefly of the trench work, the Americans were kept busy stringing telephone wires, which the Germans always managed to tap so they could listen for reports of troop movements.

Every activity of the troops was duly reported to the German Staff, and at the proper time the German artillery would send over a barrage fire. Communications were first made in English, with certain sectors designated with familiar names, as Coney Island, or Park avenue, or Chicago. But the Germans always shelled the position designated.

Then it was suggested that French and Italian and other men be used in making the reports, but the Germans always found some one who understood the language. Finally the officers hit upon a German proof scheme.

They placed Jim Ash at one end of the wire and another Oneida at the other, and the pair carried on conversations that would have proved most interesting to the Germans. There was no effort made to use a code. No code was necessary, for just plain Oneida was less intelligible than the most intricate code ever devised.

### New Wireless Company.

The Independent Wireless Telegraph Company, incorporated under the laws of Delaware has established general offices at 42 Broadway, New York.

This company is an operative company and is affiliated with the Liberty Electric Corporation of Port Chester, N. Y. The latter manufactures radio apparatus as well as other electrical equipment. It is the purpose of the Independent Wireless Telegraph Company, Inc., to install, maintain and operate radio apparatus on board merchant marine. It is their intention also to maintain, inspect and look after the accounting for messages to and from ships at sea and to furnish operators for vessels where the steamship company owns the apparatus.

The company has a license to build undamped transmitters for long distance communication to and from ships at sea.

It is the intention of this company to establish service stations at the principal ports in the United States where the necessary inspection, repairs and operators may be obtained by the steamship companies.

Officers of the company are: Phillip R. Mallory, a son of the later Henry R. Mallory and who was for many years the President of the Mallory Steamship Lines; Charles J. Pannill, vice-president and general manager, formerly assistant to the Director of Naval Communications; F. K. Leatherbee, treasurer, formerly of the United States Shipping Board; and Harry L. Shoemaker, chief engineer. With these gentlemen, Clifford D. Mallory and J. B. Smull compose the Board of Directors. Frank A. Hart, superintendent of construction, formerly expert radio aid, Navy Department, Washington and George N. Robinson in charge of operating personnel.

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# QUESTIONS AND ANSWERS

### Amateur Radio Apparatus.

W. P. R.—If you understand the construction of and wiring of experimental radio instruments you can purchase parts and materials with which you can make apparatus of your own. If this is what you prefer to do we can advise you where to purchase parts. The instruments required for a receiving station are not very expensive, and ordinarily it pays to purchase what is required already assembled. Receiving sets costing from $15.00 upwards are now available.

### Fast Sending Tournament.

Milton A. D.—There have been several inquiries during the past few months asking when the next National Fast Sending Tournament is to be held, but it is hardly probable that a tournament can be arranged while the telegraph lines are in the hands of the government. As soon as the lines have been turned back to their owners it will be possible to organize a telegraphers' fast sending tournament with likelihood of the affair being a success.

### French Cable Company.

R. E.M.—The French Cable Company maintains 310 miles of pole line between New York and Cape Cod, Mass., on which is strung 1,170 miles of wire. The company also has a submarine cable 325 miles in length between New York and Cape Cod, at which latter point the company's ocean cable lands.

### Elisha Gray and Thomas T. Eckert.

G. M. D.—Elisha Gray was born in Ohio on August 2, 1835, and died January 21, 1901. Thomas T. Eckert was born in Ohio on April 23, 1825, and died October 20, 1910.

### Wave-Length of Aerial.

H. H. L.—A radio aerial consisting of four wires spaced two and one-half feet apart, the wires stretched parallel to the earth at a height of ninety feet has a wave-length of approximately 350 meters. An aerial of four No. 14 gage wires spaced two feet apart and mounted at a height of forty feet has a wave-length of about 160 meters.

The capacity of an aerial 100 feet in length is approximately .0004 microfarad. A condenser connected in series with the aerial increases its natural wave-length.

### Montreal Telegraph Company.

R. M. P.—The Montreal Telegraph Company was organized in the year 1847 with a capital of $60,000, and in that year Ezra Cornell built a line from Troy, N. Y., to Montreal.

### Early Fire Alarm Telegraph.

F. W. L.—In the year 1852 Farmer and Channing applied telegraph lines and instruments for fire alarm signaling purposes in the city of Boston.

### Radio Loading Coil.

Harold G.—A loading coil with a 2,000 meter wave-length may be made up of a tube twelve inches in length, two inches in diameter, and wound with one layer of No. 22 wire.

### Spring-Jack Switchboard.

C. C. L.—The telegraph spring-jack switchboard was introduced by George F. Milliken, in Boston, in the year 1855.

### Number Signals.

E. M. D.—On land lines, both railroad and commercial, where the Morse alphabet is used, the following signal abbreviations are in common use:

1. Wait a minute.
4. Where shall I go ahead?
5. Have you a message for me?
7. I have a message for you.
8. Wait, I am busy.
9. Wire message, or train order.
13. Understand. (Do you 13?) (I 13.)
25. I am busy on another wire.
30. Finished. Or, Good Night on press report.
73. My compliments to you.
92. Deliver.

The telegraph departments of railroads have in many instances assigned special meanings to certain figures and numbers, in addition to those listed above.

### The Speaking Arc.

F. E. D.—The discovery made by your friend is interesting but not new. Dudell in the year 1900 discovered that a direct-current arc shunted with a condenser in series with a self-inductance will, under certain conditions give out a musical note and transform part of the direct current into alternating current with constant amplitude.

### "The Observer."

F. L. S.—No. "The Observer," the author of the series of articles entitled "Shop Talk," which for some time has been running in our columns, is not stationed at a mahogany desk on the forty-second floor of a building on Broadway, but he may be some day. At present he is a chief operator in one of the largest commercial telegraph offices west of Pittsburg. Some day he may permit us to say who he is.

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# Electro-Physics for the Telegraph, Telephone and Radio Student

No. 4.

Sound requires matter of sensible density for its path. In the following manner we may show that sound waves are impossible in a vacuum:

Suppose we set an alarm clock to ring at a certain hour, and then place the clock in a glass vessel or globe, and with an air-pump exhaust the air from the globe. When the time arrives for the alarm to sound, we shall see through the glass that the hammer is pounding away at the gong, but we hear absolutely no sound; this is because there is no air in the vessel to be acted upon by the vibrating sides of the bell.

General characteristics of waves in any media, concern (1) their *refrangibility* and (2) their *penetrativeness*. By refrangibility is meant the tendency of the waves to be deflected upon passing into a medium sufficiently dense to turn them from their direct course; and penetrativeness concerns the power of the waves or rays to pass through solid matter.

As has previously been stated, sound waves require matter of substantial consistency for their highway; they cannot make headway in a vacuum, but make a good showing in air or other matter of sensible density. Should you place your ear close to the end of a long rod of iron or wood, and have a friend scratch with a pin the opposite end of the rod, you will find that the least scratch can be plainly heard, not through the air, but through the material of which the rod is made. Again, should some one strike one of the poles in a telephone or telegraph line a hard blow with a stick, you can, by placing your ear close to a distant pole of the same line, hear the sound of the blow transmitted to your ear through the poles and connecting wires, and then, a second or so afterwards, hear the sound as carried to your ear through the air. This experiment shows that sound waves do not travel as fast through air as they do through solid matter. And while this is true, yet, a vigorous sound wave in air will be completely stopped in its progress upon arriving at a solid obstacle. The solid does not take up and relay the sound wave arriving through the air, but simply arrests its progress and declines to permit passage. This fact is worth noting, for there are other kinds of waves which have no difficulty in getting through solids.

In regard to the refrangibility of sound waves, it can be shown that they are deflected from solid surfaces very much in the same way that a stream of water from a hoze nozzle is deflected from the face of a brick wall, with the exception that the water, being subject to the force of gravity, falls to the ground when its force is reduced, while the deflected sound waves continue in their altered course for a considerable distance from the point where their course was changed. This fact explains the phenomena of the echo and of ventriloquism.

We have to remember that sound is the sensation produced upon the organ of hearing by vibrations in the air. When we speak, we do not shoot the air expelled from our lungs, into the ear of the listener; the act of speaking simply condenses the air immediately in front of the mouth, and sets it into vibration, thus creating sound waves which travel out in every direction at the rate of about 1,125 feet per second. By lightly tapping a thin glass vessel, we set its sides in vibration, and a musical sound is produced. If the vessel is a large one, we can plainly see the vibratory motion of its sides. We tap a small table bell; its sides are set in vibration, which causes condensation and rarefaction of the surrounding air;, and our sense of hearing, being acted upon by the waves, interprets them as sound. The fewer the vibrations per second, the deeper will be the sound produced. Increasing the frequency of the vibrations increases the shrillness of the sound. The scale of the average piano begins with C, of 32 vibrations per second, and extends to A"", of about 4,000 vibrations per second.

*(To be continued.)*


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## SHOP TALK.

### Passing Signals Through Repeaters.

BY THE OBSERVER.

Overindulgence often proves disastrous. I have in mind some of the repeatermen and some of the men at the switchboard.

Since semi-automatic sending machines are used on nearly all duplex and quad circuits it has become the fashion to "line up" by asking the sending operator to "dot." Not a bad idea, if the machine is properly adjusted and operated. However, many operators hold the dot-making key too long, permitting the signal gradually to fade away, the result being that repeatermen instead of adjusting for the dot impulses at their operating periods, consider the whole series, and protest: "It's uneven," or, "It fades," and so on.

I have seen cases where an alternating current transmitter was used to line up long circuits which were corded through at some stations, on the polar sides of quads, and the circuit declared to be inoperative because it did not carry as well as a direct-point repeatered circuit.

Throwing a circuit out for this reason is inexcusable, for by lining up from machine dotting and terminal office sending it is possible to localize troubles in sections and apply the required remedy in that section.

Another difficulty is that some repeatermen are reluctant to be guided by suggestion from their neighbors on either side.

Regardless of the fact that your indicator needle may be "straight up," your tape perfect, do not overlook the fact that your line relay, or your auxiliary transmitter may be seriously biased, and as a consequence the signals leaving your set biased and in some cases mutilated.

Again, at a given time your main line battery may be running with a considerable difference in the voltage pressure of the positive and negative poles. This causes unevenness of signals of a very disturbing nature.

In taking a new balance it is best to make sure that your relays are magnetically balanced.

It often happens that due attention is not given to the reversible switches, the result being 160 volts at one end and 240 volts at the other. When this occurs the man who has the 240, or higher, will have difficulty successfully passing the signals from the station with the lower battery to line, especially if the circuit is being operated at high speed.

Too many men feel personally offended when asked to clean points, or when the question is raised as to whether the signals are passing their stations properly. Those who are temperamental in matters of this kind should realize that their services are not as valuable to the company as are those of the man who can control his temper in the interests of moving traffic promptly.

Keep in mind that if points are too closely adjusted they may cause a "drag," or if too widely adjusted may cause a "drop out." Therefore, always listen to any suggestion for changes in adjustment and make every effort to locate and remove the fault in the shortest time possible.

SELECTOR OPERATION.

Some repeatermen display a lack of judgment in making selector combinations, resulting in failure to operate the desired selector.

It should be realized that a certain period of time should be allowed the gravity wheel to roll down the inclined rail; that the combination clutch will slip unless due care is taken when forming the selector call signal. Also, that holding the key open between code numbers permits the clutch to slip. Before charging other stations with delay in responding make sure that the fault is not your own.

THE BAWL-OUT IS TABOO

One of the most desirable attributes of a successful repeater chief is patience.

Morse men should remember that one of the claims made in favor of telephone communication by the railroads is that when the telephone is used the two men conversing do not waste so much time discussing each others intellectual qualifications, as is the case when the telegraph is used.

The telegraph today is engaged in a strenuous race with the telephone as a medium of communication, and the men who operate the wires and those who manage the circuits should wake up to the necessity of doing business in a business like manner; that is with despatch and politeness.

Cooperation, consideration, and a true craft spirit will go far toward winning the race with the telephone, and who should be more interested in this end than the Morse men themselves?

(*To be continued.*)

## New Book on Radio Telegraphy.

"Principles of Radio Telegraphy," is the name of a new book by C. M. Jansky, which covers the latest practice in radio engineering. The book contains 237 pages and has 179 illustrations.

The first four chapters deal with elementary electrical engineering as applied to radio work, and the remaining seven chapters go thoroughly into the subjects of electromagnetic waves, alternating currents, oscillatory circuits, radio circuits, practical transmitting appliances and methods, practical receiving appliances and methods, and vacuum tubes and their use in wireless telegraphy.

We recommend this fine work to all who are studying or who intend taking up the study of radio signaling.

The price of the book is $2.00 and copies may be purchased from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

HARVEY D. REYNOLDS, superintendent of the Postal Telegraph-Cable Company, Buffalo, N. Y., says we will have trouble if we allow his subscription to TELEGRAPH AND TELEPHONE AGE to lapse If Mr. Reynolds can send as fast today as he could thirty years ago we would promptly ask for r j as soon as he asks for the "next number."

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## EFFICIENCY ENGINEERING.

*(Continued from page 192, April 16 issue.)*

Personal efficiency is being developed by most large corporations. Many of them maintain schools which the employees are required to attend, the object being to prepare them for advancement in the service and to ascertain just what duties each person is best qualified to perform. We reproduce an article on this subject that is well worth studying:

The public knows very little, says *Industry,* of the efficient work which has been done in recent years by employers and employing corporations to promote the interests of their workers. There is some familiarity with the welfare work accomplished, although not a tithe of it is generally known. Safeguarding the health of the worker and providing for means to insure his safety has been reduced almost to a science, and hundreds of millions of dollars have been spent in this way But, aside from welfare work, much has been done in other directions, such as in the way of education, in developing men for better positions, in stimulating them mentally and physically and in bringing about a greater concentration of effort through the teaching of mental alertness and greater analytical power.

One of the very significant developments recently made public is the plan being developed in Springfield, Mass. Mr. A. W. Gilbert, president of the Chapman Valve Company, of Indian Orchard, Mass., served as chairman of a local committee to formulate a businesslike course of instruction for the purpose of training employees to fill executive positions. There has been created an institute of business and industry to be conducted by the Young Men's Christian Association in Springfield. Four courses are planned; executive, manufacturing, selling and finance. Among the subjects to be covered by the studies will be industrial organization, business English, manufacturing and its machinery, equipment and organization, accounting and cost-finding, methods of production, bookkeeping and auditing, banks and banking, business law, practical mathematics, power plants and their layout and operation, safety engineering, factory location and design, principles of salesmanship, foreign markets and sales, shipping, political economy and finance, incorporation and capitalization and allied topics.

Mr. Gilbert's committee has offered the following suggestions as to methods by which employers may co-operate with their employees in sending the latter to the institute:

"1. Company to pay entire tuition fee and remove the whole amount proportionately from weekly pay envelope of student, reimbursing the student the full amount upon completion of the course. If the student does not complete the course, he will not be reimbursed the amount which has been removed from his pay envelope by the company.

"2. Company to pay one-half and student to pay one-half, the company removing its portion periodically from weekly pay envelope and reimbursing the student upon completion of the course. If the student does not complete the course, he will not be reimbursed.

"3. Company to pay one-half of the tuition fee, and student to pay other half, student's payments being made by the company removing portions periodically from weekly pay envelope.

"4. Company to pay entire fee.

"5. Company to pay tuition fee and remiburse themselves by the removal weekly of such portion as will cover the total tuition fee during the period covered by the course."

It is understood that local and visiting experts who have acknowledged ability will be utilized to give instructions, and the value of such instruction can be easily appreciated. Each course will require two hours a night, twice weekly, for thirty weeks, every year, for three years, a total of 360 hours' instruction completing each course. The estimated cost to the student, $60.00 yearly, provides textbooks and all training and supervision. There will be no profit and no financial return.

One must look to the motive in a campaign of this kind in order to appreciate it fully. The purpose is to give a chance to ambitious, intelligent employees to rise above their ordinary work and to move themselves, as it were, into the higher departments of the business in which they are workers. The general adoption of such a plan would mean the creation of a new and vital force in the industries of the country. It would help to remove some of the tremendous responsibilities now devolving on the men who direct things in the United States.

There has been a just criticism that one of our troubles is a lack of trained men, and this must be considered in conjunction with the fact that untrained men, holding positions as workers, are very often subject to the direction and dictation of outsiders who know nothing about the business in which the worker is employed. If men are trained to an understanding of the complexity of business, of its responsibility, they will be less desirous of doing things which make these responsibilities onerous and almost impossible.

Such a course as that herein outlined reflects not only an intelligent understanding of the situation, but also vision, and it is vision which has made men in America great. It was vision which made possible the Constitution and this great Republic, and it is vision which will raise our industrial life to the higher plane where individual initiative and effort will have its proper reward, and where force, and intrigue, and agitation, and those who are responsible for them, will be eliminated.

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## THE TELEPHONE.

ALEX. COCHRANE, director of the American Telephone and Telegraph Company, died in Boston, April 10. Mr. Cochrane was born in Scotland in 1840, and came to America with his parents when he was seven years of age. He had been associated with the Bell Telephone Company since its organization.

S. A. RHODES, since 1893 in the service of the Chicago Telephone Company, has been advanced to the position of acting chief engineer Central Group of Bell Telephone Companies, with headquarters at Chicago. Mr. Rhodes succeeds W. R. McGovern who on February 1, became general manager of the Wisconsin Telephone Company at Milwaukee.

ROBERT A. DAVIS has been appointed commercial engineer of the New England Telephone, and Telegraph Company, succeeding Frederick C. Munroe.

WILLIAM A. GASTON, of Boston, has been elected a director of the American Telephone and Telegraph Company, succeeding G. D. Milne. At the annual meeting of the company it was voted to reduce the number of directors from nineteen to seventeen.

### Independent Telephone Companies.

Among the larger of the Independent Telephone Companies in the State of Indiana are the following: Central Union Telephone Company, Anderson, Ind., 3,200 telephones; Dubois County Telephone Company, Huntingburg, Ind., 9 exchanges, 2,500 telephones; Eastern Indiana Telephone Company, Winchester, Ind., 6 exchanges, 3,000 telephones; Home Telephone Company, with exchanges at Portland, Wabash, Elkhart, Noblesville, Bicknell and Angola, a total of 15 exchanges and 14,200 telephones; Logansport Home Telephone Company, Logansport, Ind., 6 exchanges, 5,000 telephones; Pike County Telephone Company, Petersburg, Ind., 2,000 telephones, and the Winona Telephone Company, Knox, Ind., 7 exchanges and 3,800 telephones.

## INDUSTRIAL.

### Western Electric Company's Annual Report.

Under date of March 17, 1919, H. B. Thayer, president of the Western Electric Company, submitted his report to the stockholders covering the company's business for the year 1918. The main figures are given herewith:

SALES

The total sales during 1918 were $145,226,000, which compares with $150,340,000 in 1917, $106,987,000 in 1916, and $63,852,000 in 1915.

Of the total sales, $67,860,000 were to the Associated Bell Telephone Companies, $21,825,000 were to the War and Navy Departments of the United States Government, and $55,541,000 were to other customers.

EARNINGS

The net earnings after meeting the high costs of labor and material prevailing throughout the year, after writing down the inventory at the end of the year on account of the decreasing values of materials then on hand, and after providing for the very heavy taxes and for other necessary reserves, amounted to..... $5,050,849

Out of which were paid:

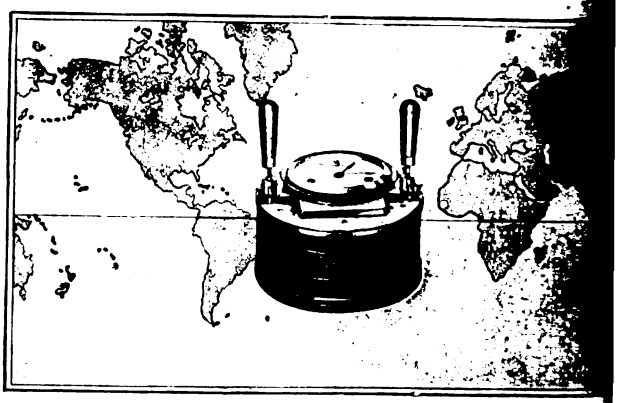
| | | |
|---|---|---|
| Interest ..... | $1,540,528 | |
| 6 per cent. dividends on preferred stock ..... | 1,800,000 | |
| $10 per share dividends on common stock ..... | 1,500,000 | 4,840,528 |
| Balance carried to common stock.... | | $210,321 |

The net earnings, as stated above, $5,050,849, were 6 per cent. on the average investment for the year, which was $84,600,000.

The rapidly increasing costs of production, experienced in common with other manufacturers during the year, resulted in lower rates of profit than usual on our standard products. This was offset only in part by increased selling prices.

On contracts with the government, final settlement has not at this date been made but it is expected that the net earnings when definitely determined will be about five per cent. on the sales.


Used in Every Country in the W



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## CANADIAN NOTES.

JOHN MCMILLAN, manager, Canadian Pacific Railway Company's Telegraphs, Montreal, was in New York, April 11 and 12, attending a conference of railroad telegraph superintendents.

### Canadian Communications Services.

The following figures are taken from Dominion and Provincial government reports recently issued, showing the present extent of the telegraph, telephone and radio services in Canada:

In 1916 no less than 10,000,000 land messages, and over 1,000,000 cablegrams, were handled; the wire mileage for telegraphs was nearly 225,000, the line mileage being about 48,000.

There are fifty radio telegraph coast stations for communication with ships at sea, the most powerful having a range of 3,000 miles—this is the record for 1916.

Telephones in Canada are very much more numerous, proportionally, than in Great Britain. The following figures apply to the year 1916:—

Number of telephones in use.....548,421
Wire mileage .....1,600,564
Persons per telephone.....14.6
Capitalization equivalent to....$77,000,000

### Canadian Pacific Honor Roll.

The following additional names of telegraphers from the service of the Canadian Pacific Railway, who served in the Great War, appear on the company's Honor Roll No. 41:

Ebenezer A. Boyle, Revelstoke, B. C., died of wounds; William Robert Copp, West Moncton, N. B., wounded; Stanley G. Moore, Esquimalt, B. C., killed in action; Arthur Murray Rutter, Fredericton, N. B., wounded; and A. Wilkins, lineman, Calgary, Alberta, killed in action.

THE CANADIAN PACIFIC RAILWAY COMPANY has decided to ask the Dominion Parliament for authorization to operate an aircraft service between such points within or without the Dominion as it may find desirable.

### Great North Western Telegraph Company.

The Traffic Department of the Great North Western Telegraph Company held its annual conference in Montreal on April 18, and 19. The following were present; Geo. D. Perry, general manager; Charles E. Davis, traffic superintendent; W. J. Duckworth, plant superintendent; E. Kenward, supervisor of telegraphs, Canadian National Railways; W. G. Barber, district superintendent, Toronto; L. S. Humes, district superintendent, Montreal; C. W. Dawzy, inspector, Toronto; Joseph Beauchamp, inspector, Montreal, H. K. Clark, chief electrician; G. T. Trowhill, traffic inspector; C. C. Stewart, traffic supervisor; G. H. Walters, chief operator; W. J. Pitfield, assistant chief operator; George Mathews, night chief operator; J. H. Yost, automatic chief, Toronto; George Sallaway, chief operator, H. A. Baker, assistant chief operator; J. C. Moore, night chief operator; G. H. Bedford, plant chief; J. B. Thompson, automatic chief; W. T. Sallaway, automatic supervisor; C. Noble, automatic supervisor; W. J. Barclay, cable supervisor; J. P. Lawrence, cable supervisor; J. A. Dressing, Morse supervisor; H. McPherson, Morse supervisor; N. A. Guerin, service supervisor; J. E. McCann, manager; J. J. Young, assistant manager; F. M. Sheppard, commercial agent, of Montreal; B. S. Round, chief operator, Winnipeg; A. A. Rogers, chief operator, Saskatoon; R. J. Daley, chief operator, Ottawa; R. F. Kenyon, chief operator, Quebec; E. C. Menger, chief operator, Hamilton; T. R. Beechey, chief operator, London; A. E. Burns, Morse operator, Toronto; E. J. Young, Morse operator, Montreal; P. N. Olson, Morse operator, Winnipeg.

All present took an active part in the discussions, and important matters were considered with a view to increasing the efficiency of the service.

It was shown that the automatic and concentration selector systems now in operation have been so satisfactory that further installations of this equipment are contemplated at an early date. The following is a list of Morkrum automatic circuits at present in operation:—

Saskatoon to Winnipeg; Winnipeg to Minneapolis, Winnipeg to Chicago, Toronto to Chicago, Toronto to Detroit, Toronto to Buffalo, Toronto to New York, Toronto to Ottawa, Toronto to Montreal, Ottawa to Montreal, Montreal to Quebec, one 3-channel multiplex, Montreal to Sydney, one Morkrum, Montreal to St. John, one Morkrum Montreal to Boston, one Morkrum Montreal to New York:

Concentration selector systems are in operation at Toronto, Montreal, Ottawa and Winnipeg.

Those present were entertained at a banquet at Freeman's Hotel on Friday evening April 18, followed by a theatre party.

The main office at Ottawa, now undergoing complete refitting, promises to be the most up-to-date and best equipped of any in the service.

Charles E. Davies, traffic superintendent, gave an illustrated lecture entitled "The Evolution of the Telegraph," before the Electric Club of Montreal, on March 26.

W. J. Duckworth, plant superintendent, was married on April 2, to Miss Mabel Briggs of Toronto.

---

A. A. OSWALD of the engineering department of the Western Electric Company read a paper on April 28, before the Chicago Section of the American Institute of Electrical Engineers on "Wireless Telegraphy and Telephony in War". The same paper was read before the Milwaukee Section of the American Institute of Electrical Engineers on the evening of April 29.

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# SIMULTANEOUS TELEGRAPHY AND TELEPHONY, COMPOSITE APPARATUS

The continued expansion in the use of line wires for simultaneous telegraph and telephone service has created a demand for simplified and efficient instruments, and recent developments carried on by manufacturers of this type of apparatus have resulted in the production of improved standard devices.

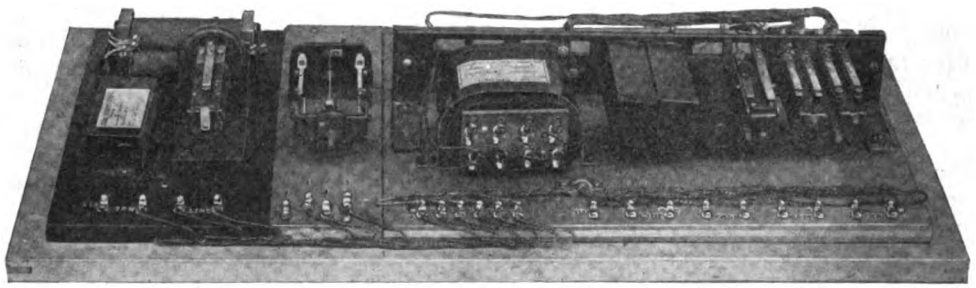

FIG. 1.

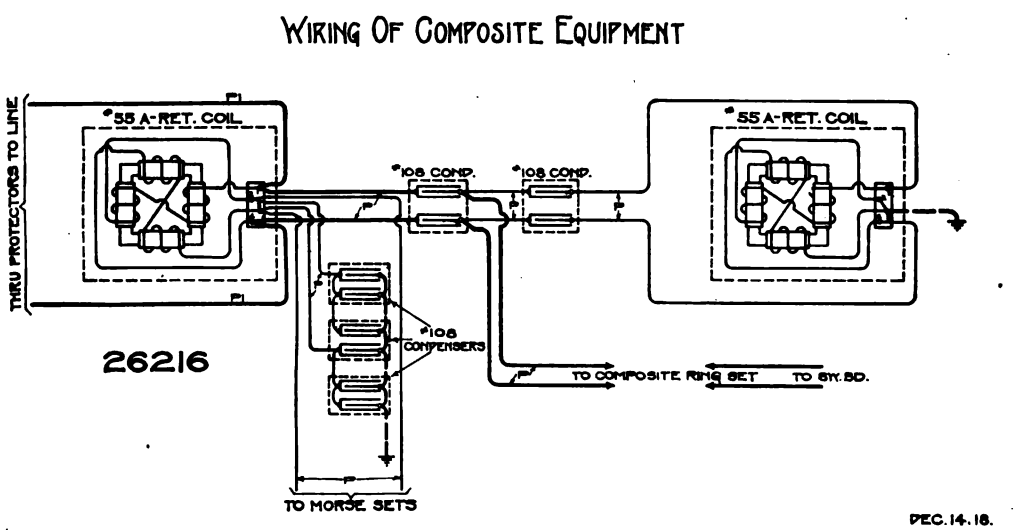


FIG. 2.

Figure 1, herewith, shows the assembled apparatus for a complete unit, with the relay covers removed.

Figure 2 shows the wiring connections of the composite coils and balanced condensers. The line wires enter the set as shown at the upper left hand corner of the diagram, the Morse telegraph apparatus being connected as indicated in the center. The wires shown extending to the telephone apparatus or telephone switchboard connect with the ringing set shown in Figure 3.

Figure 3 shows the complete wiring of the composite ringing equipment, the distinctive feature of which is that it is of the three relay type. The high frequency responding relay has a one-tenth microfarad condenser in series, thereby eliminating the difficulties experienced in older systems where the condenser was bridged around the responding relay.

The responding relay is a polarized instrument, the coils being arranged to act upon an L-shaped reed armature which engages a resilient spring, weighted at its extremity to vary the spring vibration in relation to the reed armature. The adjustment is made by an eccentric screw, its point of location being such that an adjustment can be made without materially altering the resiliency of the spring.

The responding relay is illustrated as No. 541 A-relay, insert Fig. 2, in Fig. 3. In practice the design of this relay in relation to armature and weighted spring is so balanced that an adjustment may be made which prevents opening of the contact due to normal telegraph signals.

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When high frequency current is applied to operate the responding relay, or telephone calling signal, the reed armature is set in vibration and the location of the spring contact in relation to the L-shaped armature is such that the warping of the armature causes the spring to vibrate out of step with the armature. The fact that the relay is responsive to high frequency impulses and not to telegraph signal impulses permits of a wide range of adjustment, the result being that telephone signaling difficulties are practically eliminated.

The apparatus and circuits here illustrated and described comprise the composite system manufactured by the Kellogg Switchboard and Supply Company, Chicago.

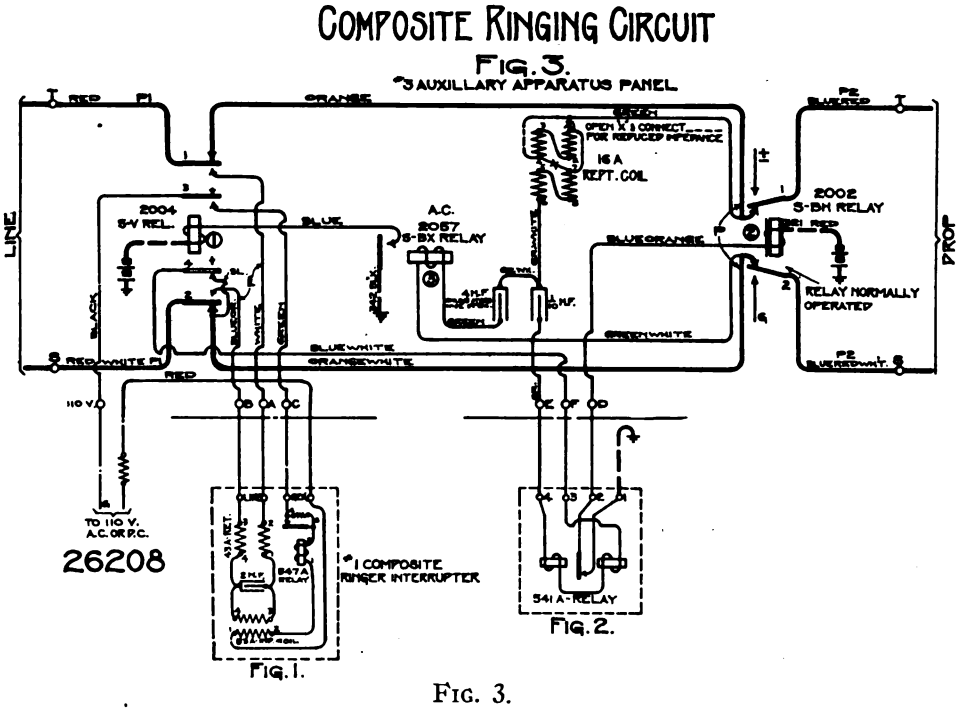


FIG. 3.

## F. B. Jewett Receives Distinguished Service Medal.

Dr. Frank B. Jewett, chief engineer of the Western Electric Company and late lieutenant colonel in the Signal Corps, U. S. A., has been awarded the Distinguished Service Medal. The presentation took place at Washington, D. C., on Saturday, April 5th.

The official citation follows:

"By direction of the President and under the provision of the act of congress approved July 9, 1918, the Distinguished Service Medal is awarded to Frank B. Jewett, late Lieut. Col., Signal Corps, for exceptionally meritorious and conspicuous service in connection with the development of the radio telephone and the development and production of other technical apparatus for the army."

Dr. Jewett, shortly after the United States entered the war, received a commission as major in the Signal Officers' Reserve Corps. His promotion to the rank of lieutenant colonel followed in the early part of 1918.

## The Attractions of Wyoming.

Chicago: "Can you pass Cheyenne?"
Denver: "No, I always stop off there."
—*The Observer.*

## P. K. Condict Now Vice-President of International Western Electric Company.

Philip K. Condict who has until recently been in government service has been elected vice-president of the International Western Electric Company, Incorporated.

In the early summer of 1917, Mr. Condict gave up his work as foreign sales manager for the company to take charge of the New York office of the War Trade Board, after a short stay with the Department of Commerce. In December, 1917, he received a commission as major in the Quartermasters' Corps, U. S. A., serving in that capacity until July, 1918. He was then detailed to the Signal Corps with the same rank and served in France until January.

## A One-Hoss Shay.

He had been speeding them over at a rate of about two per minute, and when he was clear, thinking his ability had won a transfer, said to the man at the other end: "How is your office fixed for men?" "Pretty well fixed," came the response, "I'm the only operator here."—*The Observer.*

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## OBITUARY.

DR. CORTEZ J. MAPP, aged 61 years, a former well known New York telegrapher, but for the past twenty-five years a dentist in Brooklyn, died on April 18th. Dr. Mapp was a member of the Western Union force at old 195 Broadway in the late seventies and early eighties.

ARTHUR GRAHAM of New York, who for many years was associated with the late William Marshall in the manufacture of the Marshall electric condenser, died in New York, February 27.

### Telegraph and Telephone Life Insurance Association.

Assessment No. 654 has been levied by the Telegraph and Telephone Life Insurance Association to meet the claims arising from the death of Voltaire Baker, France; Arthur W. Cough, France; Joseph Uhrig, Chicago; Charles C. Weyant, Pleasantville, N. Y.; James J. Hammond, St. Louis; and George P. Webb, Lakeland, Fla.

Assessments Nos. 655 and 656 were levied on May 1 by the Telegraph and Telephone Life Insurance Association to meet the claims arising from the deaths of Donald F. Hodges, Seattle; Wm. A. Powers, Windsor, Ont.; Harry L. Vincent, Somerville, Mass.; Wm. F. Chambers, Cincinnati; A. M. Guest, Brooklyn; Jas.C. McGlathery, Pass Christian, Tex.; John F. Sullivan, Brooklyn; Captain Chas. C. Doten, Plymouth, Mass.; Bennie H. Ling, Salem, Ore.; Wm. D, McGary, Cincinnati; Mary H. Quinn, Covington, Ky.; Daniel V. Ferris, Buffalo and S. T. Dunham, Topeka, Kans.


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*The Price is $1.15 per Copy*

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### Submarine Cable Testing.

We have received a supply of "Darby and Fisher's Students' Guide to Submarine Cable Testing." fifth edition, one of the most popular books on this important subject.

The book contains 240 pages and deals with all tests and measurements made in modern submarine cable practice. An appendix is included which contains answers to all questions presented in the main work.

The price of the book is $4.50 and copies may be had from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

### Recording Elapsed Time.

The use of toll circuits is the stock in trade of the telephone company. It is that which the company sells to the public at so much per minute, and as such it represents money just as fully as does the stock carried by any merchant.

The public should pay for all it takes. And the public has no objection to paying for all it gets, provided the amount of the commodity involved has been determined in an unquestionable manner.

For this purpose the use of the calculagraph in telephone exchanges, large or small, is indispensable.


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It takes a long time to save that amount and an emergency may come before you can do it.

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# Telegraph and Telephone Age

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**BACK NUMBERS** of this journal three or more months old will be charged for at the rate of 25 cents per copy.

NEW YORK, MAY 16, 1919.

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## "What Hath God Wrought!"

It is sometimes stated that history does not need to be exact as to detail; that rather it is the principles and the large results which are of importance. This may be so as regards political history; but where scientific invention is involved exact information as to dates, claims and other details is of the first importance.

Some time ago there appeared in the New York *World* a story about "the first telegram," in which it was stated that the first message: "What hath God wrought!" was sent by Miss "Elizabeth" Ellsworth, and that the machine used was the "electro-magnetic chemical recording telegraph." The article also stated that: "Around the table was a group of breathlessly excited people, one gray-bearded man in particular—Morse—was white and trembling with suspense. At a word from Morse, Miss Ellsworth placed her fingers on the rudely constructed instrument and slowly ticked off a message."

How different are the facts! In Prime's "Life of Morse," and in other reliable contemporary accounts of the sending of the first message, it is stated that Miss Annie G. Ellsworth merely wrote the message and that Professor Morse telegraphed it to Baltimore; that "the calmest person in the company was Professor Morse." Further, the "electro-magnetic chemical recording telegraph" was not the system employed in transmitting and receiving the message. Any telegraph man knows that a chemical recording system is not electro-magnetic.

Annie Ellsworth was the daughter of the Commissioner of Patents, and it was she who first informed Morse that the bill appropriating $30,000 to cover the costs of a trial telegraph line had been passed by the Senate. That was on the morning of March 4, 1843.

On the 24th of May, 1844, the line was ready for test between Washington and the Mount Clare depot at Baltimore, Md. The Washington end of the circuit was in the chamber of the Supreme Court.

It was Miss Ellsworth's mother, who suggested the familiar words of scripture (Numbers xxiii. 23): "What hath God wrought!" The whole verse from which these words were taken is: "Surely there is no enchantment against Jacob, neither is there any divination against Israel: According to this time it shall be said of Jacob and of Israel, What hath God wrought!"

On February 23, 1843, during the local demonstrations made to convince doubting congressmen of the utility of his invention, Morse sent a message over a wire from one part of the capitol building to a distant room in the same building, the message reading: "Tyler deserves to be hanged," and of course it is true that from the middle of March 1844, Alfred Vail, A. B. Cornell, and Morse exchanged many messages over the wire between Washington and Relay House and other points along the line between Washington and Baltimore.

Also, there was that other "first message," of January 24, 1838; "Attention, the universe, by Kingdoms, right wheel!" sent by Morse by means of the port-rule transmitter, the reception being by one of the original crude four-pen registers, the dots and dashes as marked occupying a strip of tape thirty-six inches in length. This was at Morse's first public demonstration which took place in the geological room of the University Building, Washington Square, New York. It is recorded that this laboratory experiment was through ten miles of conducting wire. These messages, however, have the same relation to the Ellsworth message of May 24, 1844, as the many work-trains on an overland railroad had to the first train that covered the whole line from terminal to terminal.

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# CURRENT EVENTS

## EXECUTIVE OFFICE ANNOUNCEMENTS, PERSONAL MENTION, APPOINTMENTS

### PERSONAL.

P. B. DELANY, the well-known inventor of telegraph devices and systems, with offices in New York, has gone to his summer home at Nantucket, Mass., for the summer.

F. D. GILES, of New York, who about two years ago went to Los Angeles, accompanied by his wife, in an automobile, returned to the city on May 1. He covered almost the entire distance from New York to Los Angeles via San Francisco in his machine, the only exception being between Buffalo and Detroit, he having made that part of the journey on a lake steamer.

DAN S. ROBESON, who in the early days built overland telegraph lines, and now a resident of Philadelphia, was a New York visitor on May 8.

### POSTAL TELEGRAPH-CABLE COMPANY.

EFFECTIVE JUNE 1, the present arrangement of hours—nine, seven and one-half, and seven—at fifty-one offices in cities throughout the country, will be changed to three tricks of eight hours each, and time and a half will be paid in excess of eight hours to all Morse operators employed at those offices. Overtime will be computed on the basis of eight hours to the day, instead of seven hours, as at present, and employees engaged on Sunday will be paid at their regular ratings on the basis of eight hours to the day.

JOHN F. SKIRROW, Associate Electrical Engineer, for the present, has assumed the duties with reference to construction matters formerly carried on by W. I. Capen.

K. L. VERNON, of the division engineer's office, has returned from military service in France and has resumed his pre-war duties.

WALTER C. POLK, consulting engineer of the Gary Investment Company, Kansas City, Mo., has been appointed to make a survey of the plant of the Postal Telegraph Cable Company for the purpose of determining the value of the properties. The reason for the survey is to get at the facts bearing upon the dispute between the telegraph company and the experts of the government wire control board. The company has from the start demanded greater compensation for the use of its line than that awarded by the government.

H. J. KEELEY has been appointed night chief operator at Denver, Colo., vice H. W. Knowles, transferred.

J. T. HOSEA has been appointed cashier of the Denver office, vice G. M. Correo, resigned.

MANAGERS APPOINTED: W. B. Hollister, Fort Dodge, Ia., F. J. Johnson, Jr., Prescott, Ark.; W. R. Abel, Clinton, Ia.; John Maxwell, Lamar Colo.; R. P. McCurdy, Pueblo, Colo.; C. L. Prefontaine, Fond du Lac, Wis.; Mrs. R. M. Cook, East Las Vegas, N. M.; R. M. Cook, Gallup, N. M.; A. J. Smith, Goldsboro, N. C.; Edna M. Stennett, Grants Pass, Ore.; T. K. Summerhill, Texarkana, Ark.; J. R. Shannon, Wilson, N C.

### New York Postal.

WALTER REDLAFSON, formerly manager of the office at 145 East 23d Street, has returned from military service and is now associated with manager Reinhardt in the management of the office at 75 Madison Avenue. Mr. Redlafson saw service in the Argonne Forrest, France, where he was gassed, but from the effects of which he has fully recovered.

HARRY TIER, and J. J. Barry have returned from overseas; the former is now located at the Imperial Hotel office and the latter at the 92 Leonard Street office.

MRS. M. MAY is in charge of the company's office at the embarkation hospital, 18th Street and Sixth Avenue.

J. F. MCNEILL, manager of the office at 10 East 42d Street, has returned to duty after being sick during the past ten days.

THE OFFICE at 10th Street and Avenue C is being moved to new and larger quarters at 225 Avenue C, near 14th Street. B. Motta is manager.

L. P. COLE, manager of the 239 Greenwich Street office, is away on his annual vacation, taking automobile trips to various points.

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## WESTERN UNION TELEGRAPH COMPANY.

T. W. CARROLL, general manager, New York, has returned after a trip of inspection of offices throughout Pennsylvania. Mr. Carroll states that everywhere in the eastern division the returning old employees who have been in overseas service are being reinstated in their old positions.

THE COMPANY has purchased United States Government Victory Notes to the extent of one million dollars.

WILLIAM FINN, of the engineering department, New York, has been away from his desk during the past two weeks on account of illness.

D. H. CAMERON, assistant superintendent of the cable station, at North Sydney, N. S., and who has been connected with the New York office during the past two months, has returned to North Sydney.

J. T. WARNER, formerly chief clerk in the office of Superintendent J. F. Wilson at Meridian, Miss., and who about three years ago was transferred to the Plant Department, San Francisco, and later to the office of general manager, M T. Cook, has been appointed chief clerk to superintendent, E. C. Vanderbilt, recently appointed district commercial superintendent at Los Angeles, Calif.

C. E. DAVIDSON, who has been manager of many of the larger Western Union Telegraph offices in the Southern Division, has been attached to the office of Superintendent Carroll at Charlotte, N. C.

W. T. DAVIS, district commercial superintendent, Omaha, Nebr., announces the following appointments: Wm. M. Fallon, formerly manager, Fort Dodge, Iowa, to be manager of the Dubuque, Iowa, office, vice Frank J. Kearney, resigned to go into other business, and John H. Groves, formerly assistant manager, Sioux City, has been advanced to the managership at Fort Dodge, Iowa, vice Mr. Fallon.

A. R. LUCAS, chief operator at Chattanooga, Tenn, has been advanced to the chief operatorship at Louisville, Ky., vice G. W. Phillips, transferred to Richmond, Va. H. A. Stockdale, of Memphis, has been appointed chief operator at Chattanooga, to succeed Mr. Lucas.

A CONFERENCE of the commercial department employees of the Albany, N Y., district was held at Albany, May 28. A. W. Peterson, assistant manager, was chairman of the meeting.

A CONFERENCE of managers from Albuquerque, Las Vegas, Deming, Lordsburg, Clovis, Roswell, Santa Fe, Columbus, Silver City, and Tucumcari, was held at Albuquerque, N. M., April 26 and 27.

THE WORK of installing the electrical appartus in the company's new office at Kansas City, Mo., has been begun and it is expected that the new quarters will be ready for occupancy early this Fall. The office when completed will be one of the most up to date telegraph headquarters in the country.

THE RECENTLY ORGANIZED electrical class in the Western Union Telegraph Company's office at Norfolk, Va., continues to grow. At the meeting held on April 28, it was unanimously decided to form a club to be known as the Magnetic Club for the purpose of creating more interest and enthusiasm in connection with study work by injecting the social features of a club occasionally to break the monotony of constant study.

### New York Western Union.

Many new faces are making their appearance in the Operating Department in these days. In reality they are not new faces but old ones returned with a goodly coat of French tan. They are our boys fresh from the battlefields of France. They are one and all welcome, and it is no doubt a great pleasure to Chief Operator G. C. Gute to assign them to their old circuits.

The first entertainment of the Association Western Union Employees, Metropolitan Division, was given as a euchre and dance on Tuesday, April 29, at the Imperial, Brooklyn.

As a get-to-gether affair, the party was a complete success. Over 900 members of the Association attended. The euchre party proved the popularity of the game in this locality, bringing out more than 300 players. It also served to introduce to the members, our new deputy vice-president, L. P. Tebeau, succeeding Mr. Cavanaugh, resigned. Mr. Tebeau had full charge of the arrangements, and to judge by the expressions of satisfaction heard, the affair was a tribute to his organizing ability and energy.

The euchre prizes were handsome and numerous, the music excellent.

The officers of all the division locals formed the various committees, and the harmony which prevailed speaks well for the future of the association.

On Saturday, April 26, by arrangement through Lieut. Arps, U. S. N., the Wire Club of New York inspected Admiral Mayo's flagship, the *Pennsylvania,* which leads the Atlantic fleet and is one of the greatest battleships afloat. When the ship's launch landed to get the members of the club, a large crowd on the dock proceeded to climb aboard and Gunner Booth, who was to escort the members, not being able to distinguish them from the sightseers, steamed away leaving a number at the dock.

Those who succeeded in getting over reported a very interesting visit, during which many things were explained or demonstrated. Samples of the ship's pie and music were handed out and altogether the courtesies shown were entirely beyond expectations.

T. B. YARBOROUGH, one of the oldest and most popular repeater attendants in the office, retired on a pension, May 1st. He goes to Wyoming to take up a ranch. The best wishes of the New York staff go with him.

VINCENT M. SOZZI, of the traffic department, was on April 30 married to Miss Agnes Burns, of the commercial department. About 100 friends and guests attended the ceremony.

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### Telegraph Messengers' Baseball League.

The messengers of the Metropolitan Division (Greater New York and Long Island), Western Union Telegraph Company, are looking forward with much eagerness to the coming baseball season. A Messengers' Baseball League has been formed, consisting of four teams, one from each of the districts in the division. These teams will compete with each other for the championship of the division, and a suitable trophy will be awarded to the winning team.

The following Western Union officials are managing the respective teams:

P. J. Sullivan, district commercial agent, manager first district team; D. Drew, of Superintendent McCann's office, manager second district team; W. Jacobs, manager 382 East 149th Street office, manager third district team; J. P. Donovan, manager 313 Fulton Street office, manager fourth district team.

The managers are now completing the preliminary work of selecting the teams, which has proven quite a difficult task on account of the great number of boys who tried out for the teams.

The season will commence Sunday, May 18, at 4 p. m., when the first and second district teams will play at Macombs Dam Park and the third and fourth district teams will play at the parade grounds, Prospect Park (diamond No. 2).

### Messenger Boys Banqueted.

The Western Union Telegraph Company gave a banquet at the Union Square Hotel, New York, on April 24, to the messenger boys who participated in the minstrel show recently given in the auditorium of the Washington Irving High School. About sixty boys were present as the guests of the company. J. F. Nathan, commercial general superintendent, and other officials of the Metropolitan Division were present.

### Washington Western Union.

On April 29, the members of the Association of Western Union Employees gave a minstrel show and dance, in the Pythian Temple Hall, which proved to be a great success. The performers were: Cola M. Early, interlocutor; Herman Godfrey, John Miller, Edward Howard, Ralph DeLavergne, Louis Gramlich, and Theodore Burke, end men; Joseph Gannon, Alfred Wenzel, Joseph Gross, Edgar R. Kidwell, and Roy Easter, soloists. The Grand March and other musical entertainment was conducted by Fred Helwig.

John Miller, one of the endmen, during the war was in the aviation service and was on seaplane 1C-74 at the time that machine caught the German submarine boat which, it is stated, sank the mail boat *Leinster,* on which several cable employees were passengers.

### Albert R. Lucas.

Albert R. Lucas, recently appointed chief operator of the Western Union Telegraph, main office, Louisville, Ky., began his telegraph career as operator on the Atlantic Coast Line Railroad at Wilson, N. C., in the year 1896. In 1899, he entered the service of the Western Union at Savannah, Ga., and later was employed as operator and night chief operator for the Postal Telegraph-Cable Company at Augusta, Ga. Re-entering the service of the Western Union Company, Mr Lucas was employed as chief operator of the office at Charleston, S. C., from which place he was recently transferred to the Louisville, Ky., office.

### Ralph D. Blumenfeld.

One of the most frequently quoted London newspapers in this country is the *Express.* This influential English publication, it will be interesting to note, is controlled and edited by Ralph D. Blumenfeld, for many years a well known telegraph operator in the States. Mr. Blumenfeld is a Wisconsinian by birth He was one of the first, if not the first, operator employed by the Postal Telegraph-Cable Company in Chicago. He came to New York in 1885, where he later entered journalism. His advancement to the front ranks of newspaper management in London has been rapid. He is regarded as one of the powers in newspaperdom of Great Britain. Mr Blumenfeld was Chicago agent and correspondent for TELEGRAPH AND TELEPHONE AGE while a resident of that city.

At the present time, Mr. Blumenfeld is in the United States on a business trip. In addition to calling upon many friends in New York, he visited several Western cities. Mr. Blumenfield will return to London within the next week.

### Western Union Lines on the Louisville and Nashville Railroad.

Judge Walter Evans, in the federal court at Louisville, Ky., on April 30, handed down a decision authorizing the Western Union Telegraph Company to proceed to condemn right of way along the lines of the Louisville and Nashville Railroad for its poles and wires.

The case between these two companies has been in litigation for seven years, and the opinion as handed down refused to dissolve the injunction as to the telegraph lines in Kentucky, as petitioned by the Louisville and Nashville, on the grounds that the Kentucky Legislature passed a law in March, 1916, which held that no telegraph company in the State could condemn along the right of way of a railroad.

The railroad company expects to take an appeal from the judgment of Judge Evans to the Circuit Court of Cincinnati.

The Western Union had a contract with the Louisville and Nashville, providing for poles of that company along the railroad right of way, but

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this expired five years ago and the Western Union began condemnation proceedings to provide a pole line right of way along the railroad right of way. At that time there was a law providing for such condemnation proceedings, and according to the law the railroad company was entitled to any damages it sustained by reason of the telegraph poles. The Louisville and Nashville sued for damages and a verdict of $5,000 was given, after Judge Evans had ruled out certain claims. The railroad company appealed to the Circuit Court at Cincinnati, and that court reversed Judge Evans on the ground that proper damages had not been allowed, and in its opinion set out the elements of damages to which the railroad company was entitled and ordered a new trial.

Meantime the Kentucky Legislature had repealed the law which permitted the condemnation of a railroad right of way by a telegraph company.

The Louisville and Nashville then made a motion to dismiss on the ground that there no longer existed a law under which condemnation action could be taken.

## THE CABLE.

CLARENCE H. MACKAY, president of the Commercial Cable Company, on the release of the cables by the government, was presented with an engrossed memorial by the members of the staff of the Commercial Cable Company—executive, traffic, and financial departments—commemorative of the return of the cable properties.

MORRIS ALEXROD, of the Commercial Pacific Cable Company, is in New York on vacation. During recent years Mr. Alexrod has seen service in China, Japan, Guam, Midway Islands, and at Honolulu.

A SUBMARINE TELEGRAPH CABLE has been laid between Montevideo, Uruguay, and Port Stanley, Falkland Islands; the latter a British possession eastward from the extreme southern point of South America. The new cable is 1,200 miles long.

### Japanese Favor Additional American Cables.

At a dinner of the AmericanJapan Society held in Tokio, Japan, on the evening of April 24, which was attended by several prominent Americans, Viscount Kaneko said that "America is the father of modern Japan," and that "there should be another Pacific cable by way of the Aleutian Islands, to insure quick communication and to remove the possibility of misunderstandings and nullify the efforts of sensational newspapers and mischief-makers."

THE TELEGRAPH OFFICE of Swift and Company, Chicago, handles about two million telegrams per year. The office is connected with the company's headquarters in other cities by 7,000 miles of private lines; twenty cities being reached direct. The Chicago office employs twenty-five telegraph operators.

## RADIO TELEGRAPHY.

VICE-PRESIDENT and GENERAL MANAGER E. J. NALLY has returned from a business trip to Washington.

MESSRS. E. B. PILLSBURY, W. A. Winterbottom, A. Stein, Jr., F. H. Kroger and R. C. Edwards, of the executive offices, visited the high power stations at Marion and Chatham, Mass., recently.

B. S. Y. CLIFTON is now at Marion, Mass., as engineer in charge.

W. A. WINTERBOTTOM, traffic manager, is receiving congratulations on the birth of a second son.

MISS HENRIETTA PLEINES, of the commercial manager's office, was married, on April 23, to James A. Templeton of Jersey City.

### Institute of Radio Engineers.

At the regular monthly meeting of the Institute of Radio Engineers, held in the Engineering Societies Building, New York, Wednesday, May 7, Dr. H. J. van der Bijl, of the Western Electric Company, delivered a paper entitled, "The Detecting Efficiency of the Thermionic Detector." The paper described convenient methods for measuring absolutely, or by comparison, the true detecting efficiency of vacuum tubes.

E. F. W. ALEXANDERSON, engineer with the General Electric Company, Schenectady, N. Y., at the May meeting of the Institute of Radio Engineers, New York, was presented with the institute's Gold Medal in recognition of his scientific achievement in developing improvements in radio signaling apparatus.

### Radio Development in Canada.

G. H. Pearson, traffic manager of the Marconi Wireless Telegraph Company of Canada, Limited, Montreal, states that at the large stations maintained and operated by the Canadian company, interesting new developments are under way which will greatly improve the reliability of long distance radio communication. J. H. Picken and J. G. Robb, of the English company, both experts in designing receiving installations, are now associated with the Canadian company in the work under way. C. H. Taylor, engineer of the American company, New York, is now an official visitor at the transatlantic station at Louisburg, Nova Scotia.

### The Institution of Electrical Engineers of Great Britain, and Wireless Telegraphy.

The Council of the Institution of Electrical Engineers has decided to appoint a number of committees for the purpose of helping in the dissemination of in-

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formation regarding recent progress in various branches of electrical engineering. The first of these to get to work is the committee dealing with wireless telegraphy. During the war, radiotelegraphy became so important for military purposes that many new developments had to be kept as secret as possible; at the same time, invention and discovery became very rapid. In consequence, there is a great mass of unpublished information which will become available for the general public at an early date. The Institution is going to offer special facilities through its new Sectional Committee for the publication and discussion of this new knowledge. Apart from the fact that knowledge grows by being circulated, it is especially essential that wireless telegraphy should now be quickly transferred from the service of war to that of peace, and that manufacturers should all have as much information as possible placed at their disposal. By starting this section for the organization of meetings, the Institution hopes to help the non-official public in the overtaking of four years of arrears in the study of wireless telegraphy.

Before the war the Wireless Society of London had come into being, and was doing excellent work on behalf of the amateur. This society, will resume its work in due course. Besides this, there were at times efforts made to form a new special professional society for dealing with wireless telegraphy, and something resembling the Institute of Radio Engineers of America was projected. It has always been felt, however, that there are very real disadvantages in separating the men devoted to different branches of electrical engineering, and that there are advantages in keeping in touch even such extremes as the men who handle megawatts and those who handle microwatts. In fact, there is a general tendency for societies with a community of interests to amalgamate, and thus if a special society were formed for radiotelegraphy it might only lead, after a few years, to a train of negotiation for absorbing it into the Institution of Electrical Engineers. The advantages offered by the policy now being initiated by the Institution are obvious; for on the one hand the Institution cannot but be strengthened if it attracts the whole body of wireless telegraph engineers into its corporate life, and on the other hand the Institution can give at once to matters affecting the interests of wireless telegraph engineers the weight and prestige of the whole body of electrical engineers generally.

## Electrical Measurements and Meter Testing.

This is a plainly written book, by D. P. Moreton. The book is particularly valuable to the telegraph and telephone engineers, because it deals directly with the subjects with which they are particularly interested. The voltmeter and the ammeter are the instruments used in this line of work, and these are to be found in all modern offices. Price, $1.00 per copy. For sale by TELEGRAPH AND TELEPHONE AGE, J. B. Taltavall, publisher, 253 Broadway, New York.

## High-Voltage Generators for Radio Communication.

For use in continuous-wave radio work a number of types of small direct-current machines are now on the market. One of these is a double-commutator generator, giving direct current at 27 volts, 2.5 amperes to light the filaments of three-element vacuum tubes, and at 280 volts, 80 milliamperes, for the output circuit of vacuum tubes used to generate continuous high-frequency oscillations. The generator is mounted on the landing gear of an airplane, so that the back wash of the propeller drives the generator by means of a small two-blade wooden fan. Thus the generator runs whenever the plane is in motion, and also when it is on the ground with the engine running. Constant voltage with variable speed is secured by an ingenious arrangement of differential fields controlled by a two-element vacuum tube mounted in the streamline housing at the rear of the machine.

This generator furnishes power for sending and receiving radiotelephone messages between airplanes, and between airplanes and the ground.

For use at ground stations, a dynamotor was developed to operate from batteries. It has an input of 10 volts, 9.3 amperes, and output of 80 milliamperes at 350 volts or 166 milliamperes at 300 volts. Originally it was mounted on a light metal framework with a panel carrying a voltmeter, fuses and terminals, but recently a metal carrying case has been designed, which has a top plate mounting a switch, fuses, and terminals, to which leads are permanently attached. When not in use, these are folded inside the lid. A rubber gasket makes the box watertight when closed. This dynamo is used with continuous-wave sets for both telegraph and telephone communication.

A similar dynamotor was furnished to the Navy for use on submarine chasers, the voltages being 27.5 and 300. These machines were mounted in pairs, one serving as a spare in a spring cradle. This was done to minimize noise, which might be heard by the sensitive listening devices of an enemy submarine in the immediate vicinity.

THOUSANDS OF OUR READERS are seeking an electrical education. They realize that in the contest for supremacy in the business world they cannot know too much. Knowledge is a stock in trade. Experts in electricity have positions with big pay awaiting them. Theo. Audel and Company, 72 Fifth Avenue, New York, advertise on another page Hawkins' Electrical Guides, which explain just what you need to know about electricity. There are ten books to the set, consisting of 3,500 pages, with 4,700 illustrations. Read their advertisement for the contents of each of these ten volumes and you will conclude that this valuable educational matter is obtainable at a nominal price.

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## GOVERNMENT CONTROL OF TELEGRAPHS.

On May 3, the submarine cable lines belonging to the Commercial Cable Company, Commercial Pacific Cable Company, Central and South American Telegraph Company, Mexican Telegraph Company, and the Western Union Telegraph Company, all of which had been under government control since November 16, 1918, were turned back to their owners.

While the cables were under government control, Newcomb Carlton, president of the Western Union Telegraph Company, represented the Postmaster General in the management of the submarine lines. George Clapperton was appointed in charge of the lines of the Commercial Cable Company, and Commercial Pacific Cable Company; and John L. Merrill, in charge of the lines of the Central and South American "All-America" cable lines. When the submarine lines were returned to their owners, Mr. Carlton, in referring to these gentlemen, said: "These men have rendered every co-operation requested of them. They have been splendid in their spirit and the assistance offered. Although I played but a modest part in this matter, I have only the pleasantest impressions to carry away."

Referring to the Western Union Company's submarine cables, Mr. Carlton stated that four of the company's cables have been out of commission during the past year, owing to the difficulties of effecting repairs, but that it is expected that by October, this year, the company will have seven of the submarine lines in full operation. Mr. Carlton further stated:

"Though we have been without these cables for a year, we have during the last four years doubled the word capacity of our cables by means of scientific devices. At present the four cables are doing more work than eight cables did in 1915.

"The last three months have marked an important era in cable communication by the introduction of printing telegraph machines over transatlantic cable systems. They are now being operated between Heart's Content, Newfoundland, and Valencia, Ireland."

### LAND LINES.

In a letter addressed to the Postmaster General, President Clarence H. Mackay, in asking for return of the Postal properties to the owners, said:

"If you will return our lines at once we will within twenty-four hours reduce the telegraph rates throughout the United States by the 20 per cent increase which you inaugurated April 1, 1919. This will mean a saving to the American people of over $1,000,000 a month, if the Western Union would do likewise, as competition would force it to do."

Replying to President Mackay's request, Mr. Burleson said that to return the Postal to private management immediately, as asked by Mackay, would give that company an unfair advantage over competitors.

Mr. Burleson's telegram follows:

"Replying to your telegram, thirtieth, you are advised that the public interests require that the telegraph and telephone systems now being operated under government control all be handled as one proposition until congress takes some action with respect to them.

"To do as you request would result in the wires under government control being in competition with a private corporation in those parts of the country where traffic is most profitable and leaving the burden of giving to the public under a comprehensive schedule of rates a nationwide service, serving the unprofitable territory as well as the profitable.

"This would enable your corporation to take the profitable business and continue to disregard the equally important but more costly service for the entire country.

"The interests of the public service must be guarded before private interests can be considered. The business of your company is in no way jeopardized by continued government control, and under no circumstances will be."

### LEGALITY OF TARIFF INCREASES.

Arguments in the telephone and telegraph case, involving the authority of the Postmaster General to increase intrastate toll rates, were concluded May 9 in the Supreme Court, and the cases taken under advisement. In view of the importance of the questions involved both in the wire cases and railroad rate cases, it is believed the court will render decisions before the summer adjournment, on June 9.

The court before recessing May 9 until May 19, issued an order permitting the Postmaster General to continue to charge increased telegraph rates in Illinois and temporarily stayed the carrying into effect of injunctions issued by Federal Judge Landis, enjoining the Postmastser General from making the increase effective. The order, which was announced by Chief Justice White, remains in effect until the appeals have been finally disposed of.

### PROPERTIES OPERATED AT A LOSS.

On May 8, Postmaster General Burleson gave out the following statement:

"A statement is being prepared by the Wire Control Board for the use of congress which will show the financial operations of each of the wire companies during the period of government control.

"In the matter of fixing compensation for telegraph and telephone companies which the government took over under the joint resolution of congress, a basis was adopted which proved acceptable to the companies which do the larger part of the business, with the exception of the Postal Telegraph Company. The compensation so fixed was in every case more favorable to the government than that fixed by congress as a basis for compensating the railroads. For purposes of administration the compensation thus agreed upon is considered a charge on the operating revenues and the operating expenses due to increased cost of labor and materials, taken in connection with the falling off of business and resulting loss of revenue coming with the armistice, made certain increases in the rates necessary."

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# Seventy-Fifth Anniversary of the Telegraph

**On May 24 It Will Be Three-fourths of a Century Since the First Morse Telegraph Line Was Operated**

May 24, 1919, will be the seventy-fifth anniversary of the sending of the first message by Morse's telegraph between Washington, D. C., and Baltimore, Md. The date of the sending of this historic message is regarded as the birthday of the electro-magnetic telegraph.

It was on May 24, 1844, that Professor Morse, himself transmitted the message "What hath God wrought!" from the temporary telegraph office in the chambers of the Supreme Court, Washington, to Baltimore, Md., the message being received at Baltimore by Morse's assistant, Alfred Vail.

PORTRAITS OF MORSE.

An interesting group of four portraits of Morse is presented herewith, each picture representing a different period in his life. The first showing him as a young man in the twenties, is of exceptional interest from the fact that it is a reproduction of a miniature painted on ivory by Morse himself, who produced the likeness by viewing his own features as reflected by a mirror. The young artist represents himself with palette and brushes and garbed in the style of artists of his day.

The second portrait at the right of the first shows Morse as he appeared at the time he worked on his telegraph. The face is that of a man of fifty years or thereabout, with character and determination depicted in every line. The picture in the lower left corner shows Morse ten years later at a time when his scientific reputation was firmly established. The second and third pictures are reproductions of old daguerreotypes. The fourth picture showing the honored inventor in his declining years was made from a photograph made in New York, and is the likeness with which most telegraph people are familiar.

MORSE AS AN ARTIST.

On April 27, 1916, the National Academy of Design gave a dinner to its members at Delmonico's, New York, the occasion being the 125th anniversary of the birth of the Academy's first president, who was S. F. B. Morse.

Morse was born in 1791 and from the time he was twenty-eight until he was forty years of age he was ranked as one of the greatest American portrait artists, and was the chief founder and first president of the National Academy of Design which was formed in the year 1826.

In 1837 congress passed a law authorizing a committee to engage with four American artists for the execution of an equal number of paintings to fill the vacant panels in the rotunda of the capitol, each to cost $12,000. Prof. Morse greatly desired to secure one of these commissions—for which he and his friends thought he was well qualified—and was much disappointed when, through political enmity, attributed at the time to John Quincy Adams, he was denied the honor. His fellow academicians sympathized with him and resented the action of congress. They formed an association for the purpose of retaining Morse to paint a historical picture, and $3,000 was quickly raised. Mr. Morse was greatly affected by this professional generosity, and expressed his determination of undertaking the commission. The picture was begun and some of the money was paid in, but it was destined never to be finished, as Prof. Morse's attention was now almost entirely taken up by his work on the electric telegraph. On March 15, 1838, he wrote a letter to the association, in which he said:

"Circumstances relating to the telegraph, invented by me in 1832, will require my attention for an indefinite time, and I am about to visit Europe, principally in reference to matters connected with this invention. At the same time, indeed, I have in view some studies connected with the picture which the association have commissioned me to paint for them. Yet I ought not to conceal from the gentlemen who have so generously formed the association, that circumstances may arise in relation to the telegraph which may make it a paramount duty to myself and to my country to suspend for a season the commission with which they have honored me. In this state of suspense I have to request that no further collections of the installments be made until my return from Europe in the autumn, at which time I shall doubtless have it in my power to acquaint you with the course which it may be thought advisable to pursue. If possible I wish as soon as practicable to relieve myself of the cares of the telegraph that I may have my time to devote more strenuously than ever to the execution of my picture and the benefit of the academy and of the arts."

It is undoubtedly true that the processes of thought which made Morse a great artist brought to him the vision, necessary at the time, to achieve success as an inventor of a system so revolutionary as was the electro-magnetic telegraph. There were in the United States at that time several scientists much better equipped in a technical sense to invent and perfect an electric telegraph; but when the greatest of them all—Joseph Henry—centered his talents upon other and less important studies, the importance of the artist's vision in estimating future possibilities at once is apparent.

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It is illuminating to review the names of Morse's contemporaries. At that time there were, in France: Peltier, Arago, De La Rive and Ampere; in England, Faraday, Cooke, Wheatstone and Ronalds; in Russia, Jacobi and Schilling; in Germany, Ruhmkorff, Lenz, Steinheil, Ohm and Sommering; and in America, Joseph Henry, Page, Silliman, Day and Frisbie. In scientific history these men all are famous as foremost scientists of their time, and most of them were in the hey-dey of manhood when the artist Morse by patient and persevering effort gave to the world the crowning electrical achievement of the century.

The fact that the five years intervening between October, 1832 (the date of the Morse-Jackson conversation on board the *Sully*) and November, 1837, when Morse notified the Secretary of the Treasury that he had developed his telegraph system to a point where it was ready for exhibition, were consumed by Morse in studying the requirements and in constructing the first crude apparatus but calls attention to the fact that there was an exended opportunity afforded others who may have been better informed electrically. That others did not during this period overtake and pass Morse in the march toward the goal of success points to the conclusion that Morse, and Morse only, had the true conception of the needs and the possibilities of the invention.

SAMUEL F. B. MORSE
Four Periods in His Life.

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BEGINNING THE WORK.

When Morse arrived in New York, from Europe, November 15, 1832, he at once set to work experimenting along lines suggested in numerous sketches and diagrams which he had recorded in his note-book while on shipboard, but owing to lack of funds and to inadequate shop facilities it was not until 1835 that he was able to assemble a working model embodying his ideas. By September 2, 1837, he had succeeded in building two instruments—one for each end of a circuit, and on that date gave a public demonstration of his invention in the great hall of New York University, where he was at that time employed as a professor.

It was on this occasion that Morse had the good fortune to meet Mr. Alfred Vail, son of Judge Stephen Vail, proprietor of the Speedwell Iron works of Morristown, New Jersey. Alfred Vail was then thirty years of age and had recently graduated from the University of the City of New York. Upon witnessing Morse's telegraph demonstrations in 1837, Vail became intensely interested, and learning that Morse was in need of capital and of mechanical assistance, undertook to induce his father to furnish financial backing for Morse's enterprise, and himself agreed to take up the work of constructing improved apparatus at Speedwell.

Morse's *caveat* was filed in the patent office at Washington, October 6, 1837, and his application for letters patent was filed April 7, 1838.

On November 28, 1837, Morse advised the Secretary of the Treasury at Washington—with whom he had had previous correspondence regarding the telegraph—that he had succeeded in operating a telegraph circuit ten miles in length.

From the year 1837 until 1842, Morse's time was taken up procuring patent protection in European countries, giving exhibitions of his system in the large cities in this country, and in perfecting details of the mechanism of the telegraph. Also, during these years a continuous effort was made to induce the American government to make an appropriation to defray the costs of establishing an experimental line of telegraph between two of the eastern cities. In December 1842, Morse was persuaded to make one more application to Congress, and on March 3, 1843, a bill appropriating thirty thousand dollars to aid the enterprise passed through the house by a close margin.

Plans were immediately made to construct a line between Washington and Baltimore, the conductors to be laid underground between these points.

Ezra Cornell, later the founder of Cornell University, was engaged to take charge of the conduit work, leaving New York for Baltimore on October 17, 1843. The conductors consisted of four insulated No. 16 copper wires inclosed in a lead pipe which was laid in a trench between the double tracks of the Baltimore and Ohio Railroad extending between Washington and Baltimore.

Early in the year, 1844, it was discovered that the conductors in the pipe were badly mixed, after about ten miles of the underground system had been constructed. The underground scheme was then abandoned and the wires strung on poles.

On May 24th, 1844, the famous "first message," "What hath God wrought!" was sent over the line from Washington.

The Washington-Baltimore line was regarded, for a time, as government property, and on May 15, 1845, a charter was granted for the first private commercial telegraph line in America; The Magnetic Telegraph Company.

Statue of S. F. B. Morse, in Central Park, New York. Beside the Statue Stands the Late M. H. Kerner, Who for Many Years Decorated the Monument Annually on Decoration Day.

In the meantime in Europe, needle telegraph systems, dial telegraph systems and electro-chemical telegraph systems, had been established; but most of these methods of telegraphing later were displaced by the Morse system, or modifications of the same.

## Package Undelivered.

It must have been a three star telegraph office, where the railroad agent reported to his company that the box addressed to W. Utel was undelivered account party unknown.

## Birds on the Wire.

"But suddenly some kindly shock
Struck, flashing through the wire; a bird
Poised on it, screamed and flew; the flock
Rose with him, wheeled and whirred."

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## FUTURE OF MORSE OPERATION.

W. N. Fashbaugh, vice-president of the Western Union Telegraph Company, New York, in a letter recently addressed to the Chicago local of the employees' association, says:

"It should be recognized at the outset that telegraphy is one of the mechanical arts, subject to all the modifications that mechanical ingenuity and engineering theory can devise by way of improvement. Happily, it has been the history of improvements in other fields of labor that new developments in mechanical methods have brought with them new occupations and new opportunities usually superior to the old. The introduction of the linotype, superseding typesetting in the production of newspapers, the ascendancy of the electric light over gas illumination, the replacement of horse-drawn vehicles by the automobile, all are notable examples that important improvements bring a flood of benefits in their wake that more than compensate the workers for any losses or inconvenience entailed. Some changing of occupation, some shifting of employment may be necessitated but it has been the experience of the last quarter of a century that the multitude of inventions and mechanical improvements developed during that period have brought, not hardship but increased prosperity to the workers.

"With the extension of automatic operation, some readjustments of individual occupations may occur but any diminution of employment through decreased Morse operation will be more than offset by the new fields of opportunity opened up in the care and supervision of the delicate, complex machinery required. There is now a shortage in qualified automatic and high-speed repeater attendants and when the new installations in contemplation have been completed this deficiency will be more acute. For employees of a mechanical and studious bent the opportunities in testing and regulating work are excellent.

"Foreseeing the large number of men and women that would be required to attend the automatic and highspeed repeater equipment, the company made arrangements with the American School of Correspondence to conduct courses of instruction bearing specifically upon testing and regulating work. Only 450 traffic employees enrolled for the testing, regulating and inside plant course, most of whom were already in the testing and regulating ranks and therefore would not constitute any increase in that force. Of the entire number enrolled, comparatively few have applied themselves to their studies to an extent commensurate with their importance. There is no reason why those engaged in Morse operation who have the proper initial qualifications should not avail of this opportunity and prepare themselves for the more advanced work.

"While it is a source of gratification that the art of telegraphy has kept pace with the times, and that new lines of employment have been created in the service of this company, yet there will always be a big field in commercial telegraphy for the Morse operator. Morse operation is the very basis of the business. The company today employs a greater number of Morse operators, regularly assigned as such, than before automatic operation had assumed any considerable proportions, and it is my expectation that the Western Union will have on its rolls more Morse operators ten years from now than it has at the present date."

## TELEGRAPH SYSTEMS OF THE OIL PIPE LINES.

From the beginning of the development of the oil fields in various parts of the country the telegraph has followed closely after the discovery of oil, whether in paying quantities or not. In the Pennsylvania oil district in the early days the opposition telegraph companies carried on strong competition for the brokerage and message wire traffic incidental to the oil boom.

The oil companies themselves at an early stage of their operations learned that the telegraph was a very valuable aid in conducting the business. At first private wires were leased from existing telegraph companies; but a time soon arrived when the larger oil companies realized that the sums of money paid in rentals and tolls were large enough to pay for the building of privately owned wire lines. In this plan there was the added advantage that the oil companies controlled the operation of the circuits at all times, and that only men in the employ of the companies handled the messages.

In time, the privately owned telegraph systems of the oil companies grew to proportions which in the aggregate almost equalled the plant and equipment of commercial telegraph systems.

The fact that most of the lines erected follow oil pipe lines and traverse routes generally far from thickly settled communities and commercial centers resulted in these telegraph systems never becoming possible competitors of the commercial companies for public message traffic. Also, although the pipe line may be regarded as a common carrier, according to legal interpretations, the oil company's telegraph system may not be so employed.

In the United Pipe Line Division of the Standard Oil Company the telegraph employee may start in the service as an operator, operator and hourly gauger, or engineer gauger. Every district foreman and practically every gauger is an experienced operator. Every pumping station has its telegraph office and staff of operators; these men acting as sentinels along long lines of pipe systems and ready at any moment to report to headquarters any local happening, and to give any information desired about conditions.

The Prairie Pipe Line Company has in its offices at Independence, Kan., a staff of first class Morse operators. The company owns and operates about 15,000 miles of wire extending from Whiting, Ind., and Woodriver, Ill., and into Arkansas. The office at Independence works by telegraph direct with offices at Kansas City, Mo., Tulsa, Okla., Texarkana, Ark., Bartlesville, Okla., Augusta, and Caney, Kan., Griffith, Ind., and various other points.

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In Oklahoma the oil companies have about ten thousand miles of wire. Throughout the Southwest the following named companies own and operate about 40,000 miles of wire: The Gulf Pipe Line, the Texas Company, the Magnolia Petroleum Company, the Sinclair-Cudahy Pipe Line Company, the Yahola Pipe Line Company, the Pierce Oil Corportation and the Oklahoma Pipe Line Company.

Along a great many of the lines maintained, telephone wires and telegraph wires are strung on the same poles so that a duplicate service is at all times provided.

Most of the offices are open twenty-four hours each day, the men working eight hour tricks. Each position carries a stated salary, and when promotions or staff changes are made the incoming employee takes the salary rating of the man relieved.

While the work is not arduous at the telegraph stations the responsibility is great, as may be understood when it is realized that some of the pumps put 3,500 barrels of oil per hour into the pipe lines. The men stationed along the lines are charged with the duty of watching the pressure gauges, so that in case of pipe breakage, gates may be successively and quickly closed back to the source.

## The Future of the Telegraph.

Mr. C. E. Thatcher, formerly and for many years manager of the Western Union Telegraph Company at San Francisco, who some time ago resigned to identify himself with the East Bay Water Company, with headquarters at Oakland, Calif., makes the following prediction in regard to the future of the telegraph:

"A few years ago when those at the head of the Western Union Telegraph Company launched the great campaign to sell its service and educate the business world how to make a greater use of the telegraph to yield profit to the user, many who were and are still in the service, were skeptical and doubted whether the new venture would meet with success. The success of the campaign is quite evident and nowadays when conversing with representatives of business concerns it is indeed gratifying to hear expressions of appreciation of the modern telegraph service and the value that is placed upon it in a community.

"I had the good fortune and pleasure of participating, as a subordinate, in the great campaign and the experience and knowledge gained has been of such value to me since leaving the big telegraph company that it cannot be measured in money terms.

"It is my belief that as soon as the abnormal conditions, due to the war, disappear (which will shortly occur), the business world will again be receptive to new telegraph ideas. The field will be a most fertile one for the commercial department of the telegraph. Receipts and volume as recorded now will look quite small when compared with the receipts and volume a few years hence, providing a real selling campaign is launched and backed up with expeditious service."

## Gold and Stock Life Insurance Association.

At the forty-first annual meeting of the Gold and Stock Life Insurance Association, the following officers were elected: Gardner Irving, president; Charles Shirley, vice-president; Harry W. Dealy, secretary; Joseph W. Connolly, treasurer. The Executive Commitee consists of the officers, and Edward R. Tilghman, Nathaniel M. Giffen, Frederick T. Albert, Albert J. Driver and Herbert M. Heffner.

The Association now has 1,448 members, nine having been admitted since the last annual report. During the past year, twenty members died. The report shows that since the last statement thirty-seven death claims have been paid, the amount being $10,000.00. Up to date the Association has paid out in death benefits, the sum of $226,269.20.

## New York Telegraphers' Aid Society.

The annual statement of the Society for the year ended March 6, 1919, is as follows:

| | | |
|---|---|---|
| Balance on hand March 6, 1918. | | $25,043.57 |
| Receipts | | 7,468.79 |
| Total | | $32,512.36 |
| Disbursements: | | |
| Sick Benefits. | $4,022.00 | |
| Death Benefits. | 1,500.00 | |
| Expenses | 3,172.74 | 8,694.74 |
| Balance on hand March 6, 1919. | | 23,817.62 |
| Total | | $32,512.36 |

RELIEF FUND.

| | |
|---|---|
| Balance on hand March 6, 1918. | $6,672.16 |
| Receipts | 577.70 |
| Total | $7,249.86 |
| Disbursements | $ 707.21 |
| Balance on hand March 6, 1919. | 6,542.65 |
| Total | $7,249.86 |

The officers of the Society are: A. M. Lewis, president; E. F. Howell, vice-president; T. M. Brennan, treasurer; C. A. Kilfoyle, financial secretary; Mary E. Saunders, recording secretary.

## A New State.

The telegram which read from Coma City, Coma, was later found to have originated at Iowa City, Iowa. The old excuse, "That's the way he sent it."

## G. B. A.

The message was plainly addressed to Dr. A. W. Ingroom, conductor of No. 4, and by good luck it reached the drawing room conductor of the right train.

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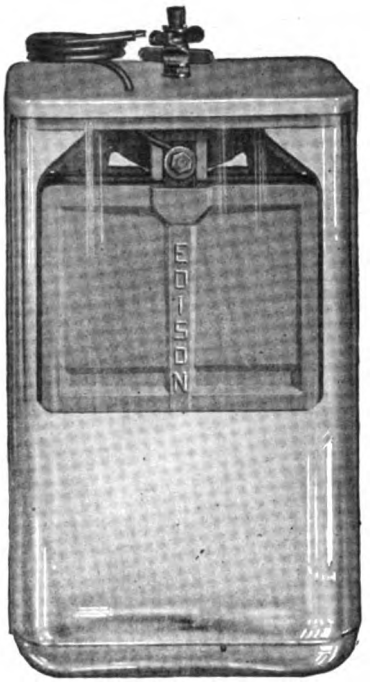
# FOR CLEAR TRANSMISSION



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## THE RAILROAD.

FRANK C. VAN ETTEN, son of F. H. Van Etten, superintendent of telegraph of the Chicago, Terre Haute and Southeastern Railroad, was on February 15, promoted to the rank of Captain, Ordnance Reserve Corps. He has been in service in France since February 15, 1918, and expects to return home about June 1, next.

The Committee of Direction of the telegraph section, American Railroad Association, held a meeting in New York, May 15. Matters pertaining to the annual convention of the telegraph superintendents to be held in Chicago, June 11 to 13, were discussed.

M. H. Clapp is chairman, and J. F. Caskey, vice-chairman of the telegraph section.

COMMITTEE, No. 4, of the Telegraph and Telephone Division of the American Railroad Association, having in charge the subject "Protection Against Lightning, Electric Light and Power Circuits," held a two days' session, May 1 and 2, at No. 75 Church Street, New York.

This Committee, which is engaged in the preparation of the plans and specifications for the electrical protection of the telegraph and telephone plants, buildings and employees of the railroads, has prepared for the Chicago convention of the Telegraph and Telephone Division, a report on the work of the committee so far completed as follows: Place in final form the report adopted at the 1918 annual meeting at Chicago of the Association of Railway Telegraph Superintendents (now known as Telegraph and Telephone Division of American Railroad Association) recommendations as to methods of protection used in connection with different combinations of cable equipment.

While a large amount of work still remains to be done which must be prosecuted during the year following the Chicago convention, the work already done will be of great value to the railroads in the installation and maintenance of protector equipment.

Members who attended the conference are: J. F. Caskey, superintendent of telegraph of the Lehigh Valley Railroad, chairman; I. C. Forshee, electrical engineer, Pennsylvania Railroad; L. Behner, engineer, telegraph department, Pennsylvania Lines west; C. Stanley Rhoads, engineer, telegraph department New York Central Railroad; H. A. Shepard, superintendent of telegraph, New York, New Haven and Hartford Railroad; H. W. Drake, engineer, Western Union Telegraph Company.

CLAUDE MAHAN, just returned from service in the Signal Corps overseas, has joined the sales forces of the Stromberg-Carlson Telephone Mfg. Co., in southwestern territory.

## CANADIAN NOTES.

JOHN MCMILLAN, manager of the Canadian Pacific Railway Company's Telegraphs delivered an address to the company's Recreation Club, Montreal, on April 23. The subject of the address being "The Story of the Telegraph." The Club has a membership of about 1,000.

GENERAL WILSON, one of the most prominent of Canadian military leaders, in an address made recently in Montreal, stated that: "The Canadian Pacific Railway Company deserves the thanks not only of the military, but of the public, for the efficiency and the celerity of its telegraph service which enabled the authorities to keep track of every troop movement from the time the units were delivered to the railway company. During the war, the C. P. R. has maintained a highly satisfactory telegraph service."

JAMES W. LEONARD, aged sixty-two years, former general superintendent of the Canadian Pacific Railway, died at Brampton, Ont., April 28. Mr. Leonard commenced his railroad career at the age of fourteen as telegrapher on the Midland Railway in Ontario, and was one of the best known railroad men in Canada.

## INDUSTRIAL.

### Non-Battery Sounder.

The relay attachment manufactured by the Railway Labor-Savings Device Company, of Davenport, Iowa, which takes the place of the local battery sounder, continues to meet with favor in both railroad and commercial telegraph service. As a reading sounder the device is satisfactory, and the cost of local battery is avoided.

### Improved Insulating Material.

The American Lava Company has issued a sixteen page booklet illustrating bobbins for resistance spools, threaded tubes, bushings, instrument mounting parts, made up of the company's high grade insulating compounds. In recent years great advances have been made in insulating materials, especially in regard to the elimination of deterioration and as to costs, and the variety of the American Lava Company's products indicates that it is meeting with success.

### Keyboard Telegraph Transmitter.

James Uncles, manufacturer of telegraph keyboard transmitters, has made several important improvements in the Yetman type of transmitter and has recently effected sales in this and in foreign countries. The transmitter is made for either American Morse or Continental code transmission, and for radio telegraph working.

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# QUESTIONS AND ANSWERS

### Erie Railroad Telegraph History.

D. J. C.—The Erie Railroad was the first line to make use of the telegraph for train operation. In the year 1853 the Erie had in service 497 miles of telegraph line, with fifty-two telegraph offices and sixty-five operators.

### Basic Radio Patents.

R. W. E.—Marconi's fundamental patent No. 7777 expires in 1921. Oliver Lodge's "tuning" patent expired in 1915.

### Wave-Length of Aerial.

W C.—In the May 1 issue, the answers given to questions submitted by H. H. L., contained an error to the extent that the word "increases" should have read "decreases." In the reply mailed to the inquirer the correct answer was given. It should be understood that when two condensers are connected in series the total capacity is less than that of the unit having the lower capacity. When a condenser is connected in series with an open circuit oscillator the total capacity is affected the same as when two condensers are connected in series; therefore a decrease in capacity will result in a decrease in the length of the radiated wave. Thanks for your interest. Our radio scouts never let anything get by that is not correct.

### "19" and "31."

W. P. D.—The reason these two numbers were selected to designate two kinds of train orders was simply that in Morse characters the numbers are quite dissimilar in sound and not likely to be mistaken one for the other. Previous to the time it became necessary to select numbers for this purpose, quite a few figure combinations had already been assigned as symbols, such as 1, 13, 25, 30, et cetera.

### Radio Detectors.

R. A. S.—Galena crystals used in radio receivers must be carefully selected and tested before much dependence is placed upon their reliability. Galena may be purchased at sixty cents per pound, but it often happens that not more than three or four sensitive crystals are found in the entire pound of material.

In order to get started, it is generally worth while to buy two or three tested crystals, even at a cost of twenty-five cents each.

### 110-Volt A. C. Ringing.

G. L. E.—If the 110-volt alternating current from power or lighting mains is of 60-cycle frequency, the alternations are too rapid to operate ordinary telephone bells. Also it is bad practise to subject conductors in telephone cables to a pressure of 110-volts A. C. The usual practise is to employ the 110-volt current to operate a small motor-generator set, the generator end of which may have an output of 24 to 50 volts at a low frequency. For a small exchange, it is an easy matter to equip an ordinary magneto with belt pulleys so that the magneto may be driven by a small 110-volt, A C., fan motor.

### Signal Corps History.

W. C. R.—There have been several excellent magazine articles written telling of the experiences of our Signal Corps men in the late war, but so far as we know there has not been any complete book published on this subject. Samuel W. Beach, chief electrician radio, and who was with the American forces in France, collected while abroad a lot of material from which he intends to write a book sometime in the near future.

### Radio Coil Insulation.

Frank W. L.—The use of shellac over cotton-covered wire on a wireless tuning coil increases somewhat the capacity of the coil; that is, the electrostatic capacity of the winding; but it is not likely that this would materially reduce the efficiency of the coil provided the turns of the winding are close together and the shellac poured over the wires after winding.

### Multiplex Telegraphy.

G. F. D.—A multiplex system of telegraphy is one by means of which more than one message at a time may be transmitted over a single wire or pair of wires. This may be a Morse duplex, Morse quadruplex, printing telegraph, or other system. The word "simplex" is sometimes employed to indicate an ordinary single Morse line over which one message at a time is transmitted. The word simplex is also used to designate a system whereby a single or duplex telegraph circuit is made up by using the two wires of a metallic circuit telephone line as the main line portion of a grounded telegraph line.

### The National Telegraphic Union.

D. W. E.—The National Telegraphic Union was organized in the year 1864. In 1866, the officers were: C. W. Hammond, St. Louis, Mo., president; W. H. Young, Washington, D. C., vice-president, L. H. Smith, New York, treasurer; J. C. Upham. Boston, recording secretary; and S. P. Peabody, St. Joseph, Mo., corresponding secretary. In 1866, after the termination of the civil war, southern telegraphers were admitted to the union.

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# Electro-Physics for the Telegraph, Telephone and Radio Student

No. 5

In the first installment of this series of articles, which appeared in the March 16, 1919, issue, was given a statement showing the vibration frequencies producing various phenomena, and in the three following installments, we considered the effects of vibrations in air.

### HEAT VIBRATIONS.

The highest audible sound is produced by about 40,000 vibrations per second in air, and although there is a great gap between this figure and 33,000,000 (the vibration rate at which electrical effects are observed) we should not conclude that there are no phenomena produced by frequencies at intervening rates. It is quite possible that in the not distant future, these elusive agents will be harnessed and put to work, if, indeed, they are not already serving us without our knowledge.

The sources of heat are the sun, the stars, mechanical, chemical and electrical forces. It is believed that the molecules of the sun are in rapid vibration and that these set in motion ether waves which travel out in all directions in a smiliar manner to the way water waves and sound waves spread out from their sources. The speed at which heat rays travel is approximately the same as that of light waves (186,000 miles per second) and like light waves, they are subject to reflection and refraction, and will travel through a vacuum. As to the penetrativeness of heat rays, it is well known that the rays from the sun pass through glass with very little loss in intensity. It may be shown that heat rays, like sound waves, can be turned from their straight path, and although lessened in intensity, the deflected rays will continue in the altered course until dissipated.

### HERTZ' RAYS.

The frequencies producing Hertz' rays border between those producing heat and those producing light. They are propagated at the same velocity as light rays, and also are subject to reflection and refraction. In one important particular Hertz' waves differ from those previously dealt with, in that there are a great many solids which are penetrable to them even after the waves have traveled long distances from their source. In fact all matter is more or less transparent to Hertz' radiation.

These rays may be generated by means of powerful electric currents; and, as we have it in our power to control the production, we can, by altering the vibration frequency produce electro-magnetic waves of different lengths, so that it is not customary to regard Hertz' waves as having any particular length. In radio telegraph or telephone work the waves transmitted through the ether may be of a length from a few inches to miles long.

### LIGHT RAYS.

By means of a glass prism, a single beam of light can be shown to consist of all of the colors of the spectrum in the following order—red, orange, yellow, green, blue, indigo, and violet. The sensation of color is caused by the reflection of these colored rays; an object which appears red to the eye reflects the red rays and absorbs the other colors of the list. An object that appears black absorbs all of the rays and reflects none of them; while an object that appears white reflects all of the rays and absorbs none of them. Light comes from the sun and all other luminous bodies; is propagated through space by means of ether waves traveling at the rate of 186,000 miles per second. Light rays arriving at the surface of a body are absorbed, transmitted, or reflected. If the surface of such body be rough, the irregularly reflected rays make it possible for us to see the object. If, however, the surface be smooth and highly polished, the rays are reflected in such manner that the polished surface shows an image of the object from which the rays proceed. When a ray of light enters a transparent body in an oblique direction the ray is deflected and its course altered. Unlike Hertz' rays, light rays do not penetrate solids to any great extent. The reason for this is that the length of light rays is about the same as the space


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between the atoms of a solid, and the rays are broken up on the surface, or close to it.

Color depends upon the number of light waves reflected from any object impinging upon the retina of the eye. In red there are about 40,000 waves to the inch, and these will strike the eye at the rate of 447 millions of millions of pulsations per second. In violet there are 57,000 waves to the inch and 690 millions of millions of pulsations per second. The other colors have wave light intermediate between these two. Color does not, therefore, exist either in the object, or in the brain, or in the mind of the observer. It is an effect. There can be no appearance of a fire on a desert island where there is no eye within seeing distance. The chemical process called combustion goes on, but there is no appearance of the flames save when its waves strike upon the retina of an eye.

*(To be continued.)*

## SHOP TALK.

### Proper Care of the Selector.

BY THE OBSERVER.

In a previous article I called attention to a booklet supplied by the manufacturers of the selector, which gives full and plain instruction how to clean and handle the great little "sentinels." Regardless of the fact that this information is available to all I have seen many cases, and heard of others, where at the first sign of trouble with the selector, the cover was removed and a knife or screwdriver used to vary the adjustments made at the factory. In some cases the wheels were rolled with too great force, and in other ways mishandled. There is no good excuse for such rough work; the instruction in the book being so plain. Unless the parts become disarranged, and this is rarely the case, the selectors usually require only cleaning, and after cleaning a small amount of clear oil at the proper points. With this care it is found in service that very little trouble with selectors is experienced.

One would not think of using a hand axe upon a watch, and crowbar action upon selectors is equally as bad. Too many attendants think that to clean a selector it is necessary to disassemble the unit. This is not the case, as it is necessary only to remove the cover and with a small squirt-gun or gasoline blow-torch inject gasoline into the various bearings, and shaft hangers, working the wheels gently by making dots and dashes on the flat brass rod at the top of the selectors. Do not soak the parts in a gasoline or carbona bath unless the magnets are first removed, for there is no need to treat the magnets. Preference is given to gasoline because it has been found that selectors cleaned with it seem to require less frequent attention than when cleaned with other oils.

The factory's ideas about adjustment are undoubtedly the best: new schemes of adjustment are not likely to be improvements.

It will be remembered by many that when the selectors were first introduced on telegraph lines the method of operating them was to employ a contrivance resembling a district-service call box, and that the call box operated the selector via the closed key; or in other words, the main line circuit was kept closed between the combination groups of dashes. This same method is practised today on commercial circuits except that the code is formed by the regular sending key manually operated. On railroad wires selectors are operated by what might be termed the open circuit system; that is, the circuit is open between the combination groups of dashes.

This difference should not exist, the systems should be made uniform. Some think the open key scheme is faster, or easier to operate; if this is so then all railroad and commercial selectors should be operated by that method. There is, of course, one possible situation where both methods might be justified: at an office to be called by a selector where there are several departments, say the operating room and the wire chief. Using the selector reversed in connection, either department may be called independently of the other. The difference in system may be the cause of some joint-offices not being able to operate the signal correctly, the selector being blamed for the failure.

As pointed out in a previous article the combination should be formed carefully, deliberately, and not too fast.

*(To be continued.)*

## DIVISION OF DUTIES IN TELEGRAPH OFFICES.

When a manager finds that it takes from 9 A. M. to 9 P. M. to complete the work incident to his position, he must realize that twelve hours' hard work per day is not only overtaxing his strength but is unfitting him for the duties to be performed the day following. That is the time to look for a remedy for such conditions. He must see where the wastes occur and eliminate them.

If he finds that he has done work that could be performed just as satisfactorily by others in the office, the work should be transferred to them, thus relieving him of the burden. If he finds that he had devoted three or four hours time talking to customers, it would be well to curtail the waste time as much as possible, without offending the patrons of the company. He should also eliminate the routine business that can be safely performed by others. If then, he is unable to finish his work within seven or eight hours per day, the matter should be brought to the attention of the superintendents in supporting his request for an assistant. An assistant manager is very helpful in such cases.

The one object that should be uppermost in mind is to never permit the company's interests to suffer, and everything that needs attention should have the fullest consideration and be disposed of if possible the day it is placed on the manager's desk. It is an old saying that if you send a request to Manager So and So, you will hear from it as soon as the mail can carry his answer back. It is equally an old saying that if you send it to Manager So and

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So, if you hear from it again in three or four weeks, he has favored you with his quality of so-called promptness.

The employing company has in these two cases, an asset and a liability. The manager, who figures as an asset in the company's affairs is the one that the superintendent will recommend for promotion, while the manager who figures as a liability is dropped from the official rolls as soon as the time for action is convenient. It is surprising to note in the correspondence that comes to the desk of a superintendent or a general manager expressions in substance, "I should have given this matter more prompt attention but lack of time prevented." There should be no lack of time to prevent transactions of company business, and the man who makes such an excuse in writing simply acknowledges his lack of business principles, which is better expressed as inefficient and incompetent.

Imagine what the impression made on the superior official would be when confronted with this statement several times each day. We wonder if for lack of time, the official failed to eat three times a day. We think not. We wonder if for lack of time to perform his duties properly, he shortened his hours of rest. We think not. The superintendents and the general managers know that when a manager indites himself with the charge that he lacks time to perform his duties, they realize that something is wrong. What is the remedy? It is simply the proper allotment of time and the disposing of subjects for consideration as expeditiously and carefully as possible. If on the office staff, there is an employee skilled in letter writing, he or she can answer the correspondence as well as the manager, if he simply passes the letter with a penciled notation, "Tell him, yes" or, "tell him, no". These are shortcuts but they are wonderfully good time-savers and that is what the manager needs—more time to sit at his desk and study how to further improve the service. One superintendent informed us that the best manager in his district apparently did no work but he did a whole lot of thinking. Thinking is invisible work. It records victories. Some men work hard and some men think hard. Combine these two attributes and you have a good manager.

## Well-Known Telegraph Men.

J. M. Key, H. A. Morse, R. E. Delay, Walter Commerce, J. G. Lines, Harry Sine, F. J. Dayman, C. A. Via, and L. W. Quick.

EDGAR W. COLLINS, general superintendent of the Postal Telegraph-Cable Company, Chicago, in a recent letter to TELEGRAPH AND TELEPHONE AGE, says: "I should feel lost without the semi-monthly visits of TELEGRAPH AND TELEPHONE AGE, because each number is filled with valuable suggestions and up-to-date technical knowledge pertaining to our business. Careful reading of this journal keeps me in touch with what is going on in the telegraph business."

## The Way of a Telegram.

I'm a telegram,
Sent collect $1.
I left Boston
In a hurry
For California,
To tell a man
His wife was
The mother of
Twins.
I had an awful
Journey,
Was switched through
Earth and sky to
New York, pushed under
The Hudson to
Hoboken, thence into
Harrisburg,
Pittsburg,
Over plains to
St. Louis, across
Prairies to Kansas City,
Up the Rockies into
Denver
Through Canyons to
Salt Lake City,
Across deserts to
Sacramento,
Down the valley to
'Frisco.
A messenger boy
Carried me to the
Twins' pa,
Who said:
"Two dashes, one dot,
Dot, space, dot,
Three dots,
Four dots."

## New Book on Radio Telegraphy.

"Principles of Radio Telegraphy," is the name of a new book by C. M. Jansky, which covers the latest practice in radio engineering. The book contains 237 pages and has 179 illustrations.

The first four chapters deal with elementary electrical engineering as applied to radio work, and the remaining seven chapters go thoroughly into the subjects of electromagnetic waves, alternating currents, oscillatory circuits, radio circuits, practical transmitting appliances and methods, practical receiving appliances and methods, and vacuum tubes and their use in wireless telegraphy.

We recommend this fine work to all who are studying or who intend taking up the study of radio signaling.

The price of the book is $2.00 and copies may be purchased from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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## THE TELEPHONE.

O. MARAHRENS, auditor of the Home Telephone and Telegraph Company, Fort Wayne, Ind., has been appointed assistant secretary of the same company.

THE MEXICAN GOVERNMENT plans to build several hundred miles of new telephone lines to connect up small towns that so far have not had long distance communcation.

SERGEANT L. B. HILL, of the 409th Telegraph Battalion, who has been a member of the American Expeditionary Forces in France during the past eighteen months, has returned home and will soon resume his position in the Plant Department of the American Telephone and Telegraph Company at Cleveland, Ohio.

TELEPHONE APPARATUS may now be imported into Great Britain without special license.

### Independent Telephone Companies.

Among the larger of the Independent telephone companies in the State of Ohio are the following: Bellevue Home Telephone Company, Bellevue, 1,600 telephones; Crestline Local Telephone Company, Crestline, 1,300 telephones; Greenville Home Telephone Company, 9 exchanges, 4,345 telephones; Local Telephone Company, Norwalk, 12 exchanges, 5,916 telephones; Sandusky Telephone Company, Sandusky, 3 exchanges, 1,700 telephones; United Telephone Company, Bellefontaine, 22 exchanges, 7,628 telephones.

### Pan-American Telegraph Notes.

Bolivia.—Direct wireless service has been established between the radio stations at Viacha and Riberalta.

Colombia.—Telephone service has been established between the cities of Bucaramanga and San Gil in the Department of Santander.

Dominican Republic.—The postal and telegraph systems of the Republic heretofore under separate managements, were consolidated on January 1, 1919. The radio station at Santo Domingo has been equipped with an improved aerial mast system. Two steel towers 150 feet in height surmounted by wood masts, 75 feet in length, have been erected.

Uruguay.—The Council of Posts, Telegraphs and Telephones, has authorized the Western Electric Company to make the necessary technical and financial estimates with a view to establishing an underground telephone system in the department of Montivideo.

### Edison Medal Presentation.

At the annual meeting of the American Institute of Electrical Engineers, held in the Auditorium of the Engineering Societies Building, New York, May 16, the Edison Medal was presented to Benjamin G. Lamme, for "Invention and development of electrical machinery."

### Municipal Electricians.

The 24th annual convention of the International Association of Municipal Electricians will be held in Chicago, September 23 to 26, 1919.

Clark E. Diehl, president, and Clarence R. George, secretary of the association, advise that plans are maturing for the presentation of many important technical papers and discussions.

### Major General Squier to Receive Franklin Medal.

At the meeting of the Franklin Institute to be held in Philadelphia, May 21, the Franklin Medal is to be presented to Major General George O. Squier, chief signal officer of the army, in recognition of meritorious work accomplished in improving electric communication.

### Signal Corps Needs Men.

At the recruiting headquarters of the Signal Corps, United States Army, 10 Bridge Street, New York, the officer in charge states that there are vacancies for cable operators, Morse telegraph operators, radio operators, and telegraph linemen. Men are needed for Alaska, Panama, Philippine Islands, Hawaii and for service within the United States.

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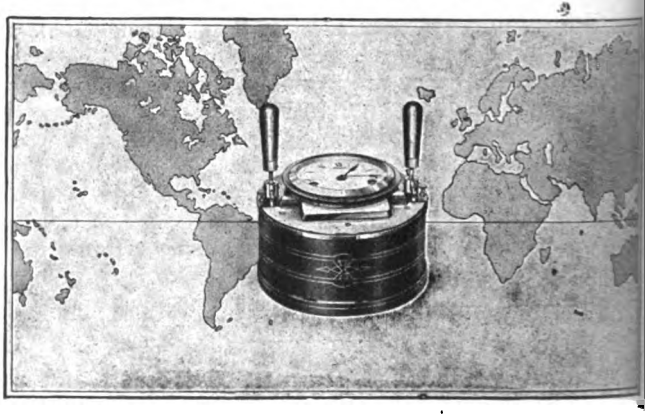

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# VACUUM LIGHTNING ARRESTERS FOR THE PROTECTION OF TELEGRAPH, TELEPHONE, FIRE-ALARM, AND POLICE SIGNAL LINES

The subject of lightning phenomena in electric circuits has within the past few years begun to receive a degree of consideration approaching that merited.

At the convention of the Association of Railroad Telegraph Superintendents held in Chicago, December 5 and 6, 1918, Committee No. 5, having in hand the subject of "Protection Against Lightning and High Tension Circuits," submitted a report which was published in TELEGRAPH AND TELEPHONE AGE of January 1 and January 16.

In the discussion of the report at the convention, it developed that a statement of the money savings effected by adequate protection could not be made up from the information received from superintendents located in various parts of the country. In most cases a degree of protection is provided which the superintendents directly responsible consider sufficient, and although in the aggregate the damage

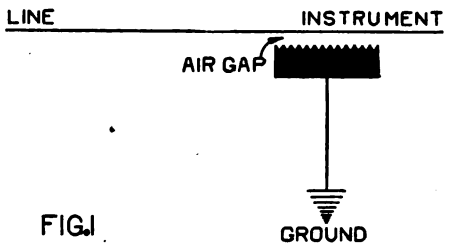


FIG.1

from lightning has been of considerable proportions, there has not been devised a method of determining what the losses would have been had no protection been provided.

One factor that enters in now, which has a changed value, is that today continuity of service is of greater value than it has ever before been. At the present time it is of the utmost importance that everything possible be done to insure that unavoidable interruptions to service be reduced to a minimum.

In the paper read by M. H. Clapp, at the St. Louis convention of the telegraph superintendents in May 1913, on the subject of lightning protection, he said:

"I have been unable to obtain any accurate figures as to the amount of loss of the various railroad companies during the past year or two due to burn-outs and loss of service. I can only say that, as far as the Northern Pacific Railway Company is concerned, the loss was over $1,500 in destroyed apparatus in one year, allowing nothing for losses due to interruption of service. This may be high compared with other roads and may have been due to conditions peculiar to the system, and a large amount of lightning; also to a few storms causing crosses between the telephone and telegraph wires and the wires of the power companies."

Some time ago, one of the large wire companies made up figures intended to determine the money loss per circuit per hour when circuits had to be abandoned on account of excessive induction from neighboring power lines. These figures while taken as averages from a large number of circuits and involving a constant volume of traffic might not apply

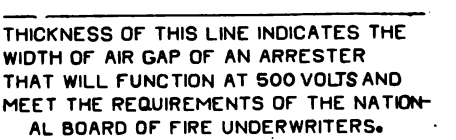


FIG.2

to railroad telegraph wires, but the fact that figures were obtained which could be agreed upon by a number of traffic engineers, indicates that it should not be difficult to make similar estimates showing the value of continuous telegraph and telephone service on railroads; and, conversely, the losses sustained when interruptions occur. Certainly, if accurate figures could be compiled covering this point, the lightning arrester problem would at once move into front position as a factor of satisfactory telegraph and telephone line operation.

In one of his papers on lightning phenomena, Dr. Steinmetz says: "The potential difference against ground, or pressure of the total electric circuit, may gradually rise by an electric charge accumulating

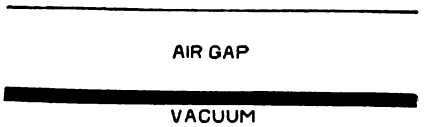


FIG.3

in the circuit—just as in a body of water, a river, the height may gradually rise until the water breaks through the embankment—the electric charge discharges across the lightning-arresters, or punctures the insulation, whichever is the point of least resistance. Some causes of this accumulation are: collection of static charge from rain, or snow-drift, or from fog, carried by the wind across the wires. Also, there is electrostatic induction from passing clouds. A positively charged cloud passing over a line, with the earth carrying a negative electrostatic charge means that the line should have a negative charge higher than that of the earth. If the line is insulated from the ground, without

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the negative charge required for electrostatic equilibrium, it thus appears at a positive potential against ground: that is, at cloud potential. With the approach of a positively charged cloud to the line, the positive potential of the line against ground rises until a discharge takes place from the ground to the line charging the line negatively. Inversely, with the cloud receding from the line, the line remains negatively charged; this charge not being bound longer by the positive charge of the cloud, discharges to earth."

The conditions here pointed out emphasize strongly the requirement that the lightning arrester should have the characteristics of a valve.

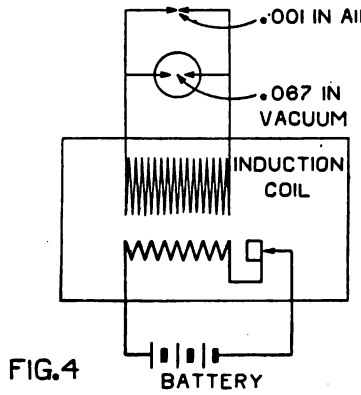
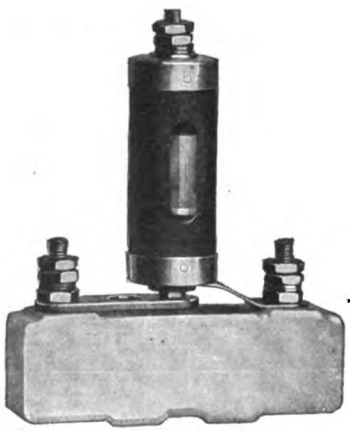



FIG. 4



Type 81 Vacuum Arrester
FIG. 5

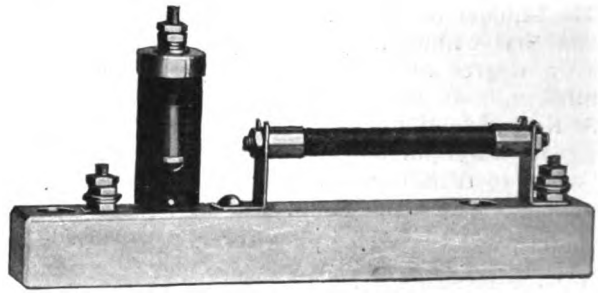
DESIGN OF PROTECTORS.

Protectors are designed according to the normal operating voltages of the line, with a view that should an abnormal voltage be impressed on the line from any source, whether it be lightning, induction or crosses with a higher potential circuit, that this current may have a ready outlet to the earth. Two things are desired in the proper design of protector:

FIRST: That the abnormal voltage impressed on the line should be completely dissipated through the arrester into the earth without dividing or permitting part of the current to pass into the operating instruments.

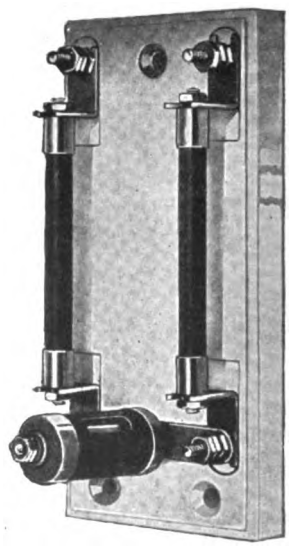
SECOND: That the protector, in so dissipating this current, shall not itself become damaged or have any of its parts affected by the passing of the current.

Various forms of mediums have been employed in arrester designs. The principal ones have been the air-gap, vacuum, non-air-gap (high resistance conductors), electrolytic. The air-gap principle has been most widely employed in protectors designed for telephone circuits. Its features are principally,



Type 72 Vacuum Arrester
FIG. 6

conductors mounted on an insulating base having the ground conductor in close proximity to the line conductor with an air-gap intervening, as illustrated in fig. (1). The closer the air-gap can be maintained, the more sensitive the arrester. Practice, however, has determined that we are limited in reducing the air-gap space on account of endeavoring to maintain a high normal line insulation after the passing of discharges. While improvements have been made by the employment of less fusable carbons or metals, still we find in telephone practice, that the necessarily small size of air-gap still causes crosses or partial grounds to occur frequently. The importance of an arrester functioning below 500 volts is not alone to meet the prescribed requirements of the National Board of Fire Underwriters, but because these requirements were formulated for the purpose of affording a safe-



Type 82 Vacuum Arrester
FIG. 7

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guard to telephone users from crosses with trolley, lightning or power circuits of 500 volts or higher. To appreciate the size of air-gap necessary to affect a proper function in accordance with these requirements, it is necessary to have this air-gap approximately four one-thousands of an inch (.004") wide, or as indicated by fig. (2).

The vacuum principle of protection is based on electrical currents passing more readily through thin air, or gases at low pressures, than through normal atmosphere, or as indicated in fig. (3).

The research work done by the manufacturing companies at great cost has been of the greatest value to the wire owning and operating companies.

The cuts used in illustrating this article have been

Type 70 Vacuum Arrester
FIG. 8

loaned us by the L. S. Brach Manufacturing Company, Newark, N. J. This company started experimenting a number of years ago in order to apply the vacuum principle to the practical protection of low voltage circuits from lightning; believing that by increasing the the actual gap between the electrodes of the arrester—thereby preserving a small air-gap equivalent for high voltage currents and static—they would not alone be able to function below the 500-volt limit with a spacing far in excess of the air-gap spacing, but be able to maintain a higher line resistance, in this, they have been successful in developing practical non-grounding arresters. Not alone were they able to meet the required specifications of the National Board of Fire Underwriters, but have gone further and have produced an arrester sufficiently sensitive to shunt one one-thousandth of an inch in air by a vacuum gap of sixty-seven times that spacing, as shown in fig. (4).

It was found in the vacuum arrester, that many other valuable features were gained. Noticeably clearer transmission, a reduction in the number of fuse burn-outs, and constant drain for static, together with the advantages of having the discharge take place in a sealed chamber, avoiding any dangers of igniting gases or becoming affected by moisture, corrosion, insects or handling.

The vacuum arrester that was originally placed upon the market, proved to be a success, and came in general use on railway, signal, telegraph, fire, police and other wire services. Its entrance into the telephone field was necessarily slow, owing to the high cost of production, and that the designs on the market were cumbersome and not readily

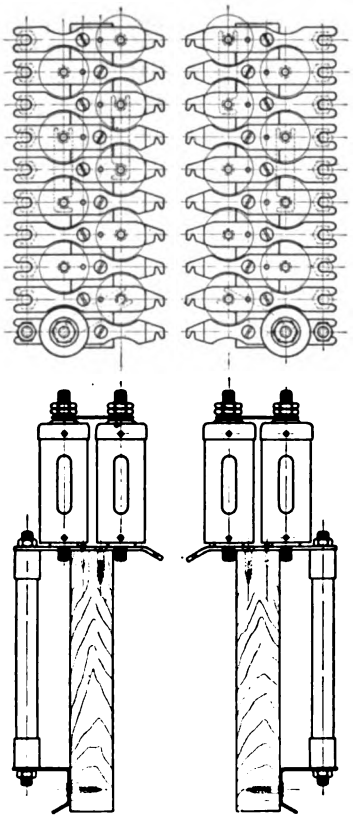

FIG. 9
Single Lines on 9/16" Centres, 10 Lines Over All
5 5/8" x 2 5/8"

applicable to universal telephone use. The Brach Company's engineers, recognizing the valuable opportunities which this principle of protection afforded, but realizing that the instrument itself required much needed modification, devoted its energies to a series of developments and changes in designs, which included enlarging their research laboratory, and the engagement of trained specialists. The results have been gratifying by the production of a new type of vacuum arrester interchangeable with a very large amount of the present telephone equipment. The new type of cartridge is protected from discharges by a mica shield internally, and from mechanical injury by a fibre shield externally, and will now withstand repeated heavy discharges and reasonably rough handling without danger of losses.

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## OBITUARY.

### Death of Frederick Pearce.

Frederick Pearce, aged 75 years, a well known manufacturer of telegraph, police telegraph and fire alarm apparatus, one of the pioneers in this line of business in New York, died at his home in Summit, N J., on May 7.

Mr. Pearce was born in London, England, and, in early life made electrical instruments for Elliot Brothers of that city. In 1863, he accepted employment with Chas. T., and J. N. Chester, pioneer telegraph instrument makers in New York. In 1872 he embarked in business on his own account. Mr. Pearce was a vice-president of the Old Time Telegraphers and Historical Association in 1905 and was a member of other telegraph organizations, including the Magnetic Club of New York, International Association of Municipal Electricians, The Electrical Contractors Association, New York Electrical Society and a number of other organizations of like character.

DR. C. N. HASKELL, a well known old time telegrapher, particularly in St. Paul and Minneapolis, where he filled official positions twenty-five years ago, died at Bridgeport, Conn., on March 5th.

MRS. CROSSWY, wife of Jesse Crosswy, correspondent for the Associated Press at Rio de Janeiro, Brazil, died May 5, at Las Vegas, N. M. Mrs. Crosswy was taken ill while on a train en route from Albuquerque, N. M., to Denver, Colo.

### Experimental Wireless Stations.

EXPERIMENTAL WIRELESS STATIONS. By Philip E. Edelman, 272 pages; 98 illustrations.

This book is intended particularly for experimenters in wireless telegraphy as a guide to a rational study of the art. One of the main objects of the book is to provide a standard design for so-called amateur stations, to take the place of the many varieties of hit and miss apparatus constructed and purchased by experimenters.

The matter has been written with particular regard to clearness, simplicity and direct usefulness, and among the subjects covered are: Nature and theory of wireless transmission; aerials; grounds and lightning protection; general features of transmitters; resonance; calculation of wave length, capacity and circuit; transformers; spark coils; transmitting condensers; design and construction of spark gaps; detectors; solid rectifiers; tuning; interference prevention; right of the experimenter, etc. A supplement contains much matter of value, which brings the book up to date and explains the audion, time signals, balancing aerials, vacuum valves, amplifiers, etc.

Copies of this book may be purchased for $1.50 each from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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For sale by TELEGRAPH & TELEPHONE AGE, 253 Broadway, New York

### Submarine Cable Testing.

We have received a supply of "Darby and Fisher's Students' Guide to Submarine Cable Testing." fifth edition, one of the most popular books on this important subject.

The book contains 240 pages and deals with all tests and measurements made in modern submarine cable practice. An appendix is included which contains answers to all questions presented in the main work.

The price of the book is $4.50 and copies may be had from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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BACK NUMBERS of this journal three or more months old will be charged for at the rate of 25 cents per copy.

NEW YORK, JUNE 1, 1919.

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## TELEGRAPH ENGINEERING.

The year 1882 was an eventful year in telegraph circles. At that time the various applications of electrical science were attracting universal attention. Telegraphy, being the first of the electrical arts, had acquired a momentum of progress which kept it well to the front.

In 1882, railroad trains were dispatched by telephone on the New York, West Shore and Buffalo Railroad, between Athens and St. Johnsville, N. Y. On August 15, that year, the first Edison electric light station was placed in service at Appleton, Wis., and on September 4, the Edison, Pearl Street station in New York was opened for service. In that year Thomas A. Edison applied for 141 electrical patents. Underground cables five miles long were experimented with for telephoning at Attleboro, Mass. The Postal Telegraph Company—then just organized—experimental with the Leggo automatic high speed system of telegraphy. The Central and South American Telegraph Company's cable line to South America was opened to the public, and the Wheatstone high speed automatic system was introduced on Western Union lines.

These records are presented to point out the conditions existing in telegraph circles in this country in the year 1882, at which time the Association of Railway Telegraph Superintendents was formed. Conditions in the year 1882 seem to have been about right for the organization of a telegraph engineers' society, and this is just what took place when the railroad telegraph superintendents formed their association. During the thirty-seven years the association has carried on its activities it has been the only national association of telegraph and telephone engineers in this country and Canada, and the fact that, so far, no other association covering the same or related services has been formed, constitutes a tribute to the thoroughness with which the railroad telegraph superintendents—engineers all—have done their work.

The published proceedings of the association, which have appeared annually, have each year contained technical papers of direct and immediate value to both railroad and commercial telegraph engineers. Subjects such as "Printing Telegraphy," "Lightning Protection," "Line Wire Transposition," "Composite and Simplex Operation," "Inductive Disturbances," "Telephone Message Circuits," and so on, have received continuous consideration from year to year.

The older members of the association remember with affection and respect the valuable technical contributions made during the early days of the association by Charles Selden, A. R. Swift, G. C. Kinsman, C. A. Darlton, L. H. Korty, U. J. Fry, O. C. Greene, G. M. Dugan, J. H. Jacoby, H. C. Hope, and other members.

The pioneer accomplishments of these gentlemen have been built upon by other and younger railroad telegraph executives and engineers, to the end that today the association, forming one of the most important divisions of the United States Railroad Administration, stands on a high plane of achievement. The activities of the association have so broadened that several committees are required to carry on the work, and a point has been reached within the past year or two where the recommendations of these committees are regarded as conclusive, and in most cases become standard practice.

The annual meeting of the association, to be held in Chicago, June 11-13, this year will, very likely, in its deliberations reflect the best thought, practices and tendencies in American telegraph and telephone engineering.

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# CURRENT EVENTS

## EXECUTIVE OFFICE ANNOUNCEMENTS, PERSONAL MENTION, APPOINTMENTS

### PERSONAL.

WALTER C. BURTON, ex-senator, now postmaster of Brooklyn, N. Y., and formerly a prominent telegrapher in New York, delivered a timely and interesting address at the Central Congregational Church, Brooklyn, on May 18, on the occasion of the Royal Arcanum's annual memorial services.

LEVI S. WILD, a pioneer telegrapher, and for many years identified with the Western Union Telegraph Company in Montana, was the subject of a long personal sketch in the Butte, Mont., *Post* of May 12.

GEORGE R. EDDY, son of W. B. Eddy, well known pioneer telephone manager, during the war served in the United States navy, making twenty-two trips between this country and European ports on the steamship *Leviathan*.

### POSTAL TELEGRAPH-CABLE COMPANY.

CLARENCE H. MACKAY, president of the company, with his daughters Katherine and Ellin Mackay, and his son John W. Mackay, will spend the early summer at Harbor Hill, Roslyn, L. I., and later in the season will live at The Orchard, Southampton, L. I., remaining there until late in the fall.

W. J. SLATER, formerly superintendent of the Postal Telegraph-Cable Company at Louisville, Ky., died in the Emergency Hospital at Washington, D. C., on May 20, of cancer of the throat. Mr. Slater during the past ten years has been manager of the Postal Company's office in the House of Representatives, Washington.

RALPH CARR, assistant chief operator, New York main office, during the recent Victory loan campaign secured subscriptions from employees for $22,000.00 in Victory Notes. Quite a number of the purchases were paid for in cash.

HARVEY D. REYNOLDS, superintendent, Buffalo, N. Y., is in New York on a business trip.

WALTER S. L. CLEVERDON, has, by the Council of New York University, been placed in general charge of the plant at University Heights. Mr. Cleverdon is a member of the Faculty of the University and has charge of classes in various departments of civil engineering. He is a son of John F. Cleverdon, chief electrical inspector, Postal Telegraph-Cable Company.

E. C. FORD, formerly assistant to the division electrical engineer at Atlanta, Ga., has been appointed wire chief of Birmingham, Ala.

R. D. BURGER, wire chief at Birmingham, Ala., has resigned to go into business for himself.

MANAGERS APPOINTED: J. O. Hayes, Henderson, N. C,; Ruth F. Skillman, Richmond Ind.; C. A. Mathany, Akron, Ohio; Jos. Milan, Suffolk, Va.; J. T. Collier, Laurinburg, N. C.; H. M. Gersbach, Stithton, Ky.; F. Sehring, Marseilles, Ill.; L. S. Canova, St. Augustine, Fla., N. H. Petrie, Plant City, Fla.; H. F. Egan, Bethleham, Pa.; R. W. Whiting, Gainesville, Tex.; Mrs. N. B. Crawford, Fredericksburg, Va.; Mrs. J. E. Noel, Guthrie, Okla.; and Mrs. F. R. Massaro, Pocatello, Ida.

### WESTERN UNION TELEGRAPH COMPANY.

THE CONSTRUCTION OF the new cable station at 34-40 Broad Street, New York, is rapidly progressing. The steel framework has been completed.

THE NEW CABLE STATION BUILDING at Hearts Content, Newfoundland, is finished, and the work of installing the electrical equipment has begun

HENRY W. PETRIE, of the Plant engineer's office has returned from an inspection of several Mid-West and Southern offices including Cleveland, Chicago, Minneapolis, Louisville and Atlanta.

E. MELOCHE of the division plant superintendent's office, Chicago, is in New York assisting at engineering work in connection with the new headquarters building now being erected in Chicago.

F. W. MOE, of the Plant engineer's office, New York, has resigned effective June 15. Mr. Moe goes to a position with the Poole Engineering and Machine Company, New York.

THE PNEUMATIC TUBE SERVICE is being improved by the installation of additional air compressors on the 13th floor of the office at No. 24 Walker Street, New York.

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IN THE BUFFALO, N. Y., OFFICE the telephone room has recently been equipped with a complete system of pick-up conveyors for handling message traffic from the telephone room to the main distributing center in the operating room.

CHIEF YEOMEN BATTERSALL and GOODWIN, of Lieutenant Tierney's staff, in the Western Union field censorship unit, have been ordered to duty on the U. S. S. *Callao,* and will sail for European waters in the near future.

J. J. MCCAFFERTY, formerly night manager of the 313 Fulton Street, Brooklyn, office, has been appointed supervisor at the Hempstead, L. I., office.

E. L. PHILLIPS, former manager at Altoona, Pa., has been appointed manager at Charleston, to succeed C. H. Simpson, who has resigned to go into business at Youngstown, Ohio. The Western Union Employees' Association, Charleston Local, gave a farewell banquet at the Hotel Ruffner for Mr. and Mrs. Simpson on the night of May 14, when the employees expressed their regrets at Mr. Simpson's leaving and presented him with a leather belt, silver trimmed and suitably engraved. Mr. Simpson had been with the company for more than fifteen years, having previously been manager at Springfield and Worcester, Mass; Brooklyn and Niagara Falls, N. Y.

F. A. PLEDGER, has been appointed chief operator at Sweetwater, Tex., effective May 6.

J. A. BRETT was on April 5 appointed chief operator, automatic department, Buffalo, N. Y., main office.

THE OFFICIALS AND MANAGERS of the Omaha, Neb., district attended a conference at Omaha, May 9 and 10. The business of the meeting concerned plans of meeting the anticipated business boom likely soon to be experienced which will undoubtedly bring increased traffic to the telegraph.

## New York Western Union.

SAMUEL FISHER, service investigator of Division Traffic Superintendent S. B. Haig's office, has been appointed to take charge of the delivery department at Baltimore, Md.

TITUS A. BROOKS, aged 64 years, timekeeper in the general operating room of this company, for over thirty years and who a few years ago retired from active service, died at Nashville, Tenn., on May 22. Mr. Brooks had suffered from asthma and other complications for sometime past and was sojourning in the South for the benefit of his health at the time of his death. Mr. Brooks was identified with all telegraph associations in New York. He is survived by a son.

## Frederick C. Cole,

DISTRICT COMMERCIAL SUPERINTENDENT.

Frederick C. Cole, who on March 15 was appointed district commercial superintendent, Seattle, Wash., for the Western Union Telegraph Company, was born at Otterville, Ontario, Canada, July 4, 1869. At fifteen years of age he entered the telegraph service in his native town as messenger, becoming an operator a year later. During the succeeding eight years Mr. Cole worked as operator in the commercial service, and as operator, agent, and train dispatcher on various railroad lines in the United States and Canada. In 1894 he became chief clerk to the superintendent of telegraph of the International and Great Northern Railroad at Palestine, Tex. Later he entered the service of the Western Union Telegraph Company and was employed as operator and as chief operator at Houston and Galveston. From September, 1905, until July, 1910, Mr. Cole was manager for the Postal Telegraph-Cable Company of Texas at Galveston, and was then made assistant to the general manager of that company at Dallas, where he remained two years.

During the past eight years Mr. Cole has been in Western Union service, advancing through the various grades of division cable manager, division commercal manager and division commercial superintendent in Texas territory.

His appointment as superintendent of the Seattle district, brings to that office a man who undoubtedly is well qualified, from long experience, to produce the results which the successful conduct of the company's business requires.

## St. Louis Branch Office Managers.

A conference and dinner of the St. Louis branch-office managers, Western Union Telegraph Company, was held on April 29 at the Planters Hotel.

The program in connection with the business conference included an address on "Personal Efficiency," by A. D. Bradley, general manager, Central Division, Omaha, Neb.; one on "Messenger Delivery, Pickup and Supervision," by W. T. Brown, division commercial supervisor, Kansas City, Mo., and one on "Team Work," by L. R. Spehr, assistant manager, St. Louis; also a talk on "Development and Creation of Business," by Messrs. A. C. Kaufman, New York, and L. J. Ferciot, manager, Omaha, Neb.

The musical entertainment for the dinner was furnished by the Western Union Choral Club, composed of Mrs. Rose Mortimer, Misses Fannie Glynn, Abbie Bartley, Rosalie Schuler, Tillie Sennewald and Gertrude Sennewald. Miss Vera Fromm, manager of the Cotton Exchange branch, St. Louis, rendered several excellent solos. Miss Eunice Kennedy acted as accompanist. F. A. Mohr was toastmaster of the dinner gathering.

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### Western Union Bowling Association.

The fourth annual dinner of the Western Union Bowling Association was held recently at the "Ritz," 14 Nevins Street, Brooklyn.

This function is held primarily for the distribution of prizes to the teams and individual members, but is considered to be largely instrumental in cementing the friendly relations and enlarging acquaintances by congregating together at a time when the stress of rivalry is absent.

This year's banquet was presided over by committee chairman W. C. Merley, who presented several entertaining numbers by team members, after which dinner was served.

After the service, President Newcomb Carlton gave one of his witty and entertaining talks, closing with the distribution of prizes.

The president's cup was not awarded this year on account of the absence of so many old members in the military service.

This cup which is at present in the custody of the vice-president of plant's team was first offered as a trophy in 1916, the year the league was organized, and first won by the accounting department's team. The latter team successfully defended their trust during the season of 1917, but lost to the vice-president of plant in 1918. By the terms of the donor, permanent possession of the cup is given to the team finishing in first place for three consecutive years.

The league is composed of teams from the following departments: accounting, treasury, district plant, vice-president of plant, vice-president of commercial, vice-president of traffic, departmental, metropolitan.

The officers of the organization are:

President, J. W. Connolly; Vice-President C. W. Frey; Treasurer, C. E. Mobius, Secretary, E. W. Pitt.

The scheme is being largely copied by many of the other large offices as attested by the very interesting event scheduled as the "Inter City Bowling Contest" held Friday, May 2.

The contesting teams were:

New York, Chicago, Omaha, Denver; the former winning the match by 22 pins, scoring 2673 to Omaha 2651; Denver 2495, Chicago 2372.

Direct wire cummunication was provided with the alleys in each town and the scores interchanged as soon as made. Great enthusiasm prevailed throughout the contest as the two leading teams were so close that the decision was in doubt until the last pin was counted.

The coming season is expected to be the most succesful since the league's inception as most of the absentees will have returned; and each organization will be able to place a strong team in the field.

The objective of the league is the encouragement of good fellowship and providing means for personal contact between the employees of the various departments through the medium of a clean, health promoting sport.

That this objective has been attained is evidenced in many ways.

## THE CABLE.

THE COMMERCIAL CABLE COMPANY has issued a new booklet in handy, desk form, which shows the cable rates to all parts of the world. The booklet contains a concise schedule of rules and regulations governing the handling of cablegrams and code messages.

THE GREAT NORTHERN TELEGRAPH COMPANY, on June 1, 1919, has seen fifty years of existence. It is reported that the company has set aside the sum of one million crowns, which will be divided among the present employees of the company and its pensioners.

### All-America Cables.

The Telegraph Construction and Maintenance Company, London, has completed the first 500 miles of cable for the Central and South American Cable Company's Brazil-Argentina connections—Rio de Janeiro to Buenos Aires, and Santos to Buenos Aires. These cables will be laid and in operation before the end of the present year.

### Japanese Cable.

It is reported from Tokio that a number of Japanese business men have decided to form a Japan-America Submarine Cable Company to lay an additional cable across the Pacific ocean. It is stated that the company will have a capital of $25,000,000, and will seek a subsidy from the Japanese government.

### Submarine Cable Working.

"Beginner's Manual of Submarine Cable Testing and Working," by G. M. Baines, is a book of 265 pages dealing in a thorough manner with the operation of submarine telegraphs.

The first four chapters contain elementary matter relating to batteries, electrical laws, etc. Chapter V. covers copper resistance of cable, instrumental zero, false zero, theory of false zero test; and in the following eighteen chapters up to date matter is incorporated explaining cable insulation tests, inductive capacity of cables, tests for broken cables, curb transmitter, mouse mill device, recorder adjustment and other matter which should form a part of every cable man's technical knowledge.

The price of the book is $4.50, and copies may be obtained from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

### Sent to Federal Prison.

Abe Shapiro, a clerk in the office of one of the telegraph companies in a southern city, who confessed the theft of the money taken in on several money transfers, was prosecuted by the federal authorities, and on May 10, was sentenced to serve one year and one day in the federal prison at Atlanta, Ga.

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## RADIO TELEGRAPHY.

### MARCONI NOTES.

E. J. NALLY, vice-president and general manager, E. B. Pillsbury, general superintendent, R. A. Weagant, general engineer and R. C. Edwards, supervising architect, have returned from a visit to the high power stations at Marion and Chatham, Mass. The party made a brief stay in Boston.

LYNN C. EVERETT, engineer, who has been in South America some weeks on company business, is returning from Buenos Aires, via the Western Coast.

GEORGE W. HAYS has been appointed commercial engineer, and John H. Sheridan succeeds him as purchasing agent.

THE MARCONI COMPANY purchased Victory Loans to the amount of five hundred thousand dollars. The employees at the Marconi Works at Aldene, N. J., subscribed $42,350 and captured an honor flag.

GEORGE H. CLARK, expert radio aid, Navy Department, Washington, has joined the engineering staff of the company.

DR. ALFRED N. GOLDSMITH, professor in charge of electrical engineering, College of the City of New York, has been appointed director of research of the Marconi Wireless Telegraph Company of America.

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THE INTERNATIONAL RADIO TELEGRAPH COMPANY has removed its general offices and factory from the Bush Terminal building, Brooklyn, to the building at No. 326 Broadway, New York. John V. L. Hogan is manager of the company, and Howard W. Dunk manager of the company's commercial interests. The executive offices are located in Pittsburg, Pa., where S. M. Kintner, general manager, has his headquarters.

J. ZENNECK, German radio expert, who arrived in this country just prior to the beginning of the war, and who was later interned by the United States government, has been paroled in the custody of a prominent American radio engineer.

THE RADIO OPERATORS detailed to duty on the naval aeroplanes which made the attempt to fly across the Atlantic, are: On the NC-1, Lieut. Henry Sadenwater; NC-3, Lieut. Commander Robert A. Lavender, and on the NC-4, Ensign Charles Rodd.

IT IS SAID that the wireless telegraph station at Ballybunion, Ireland, is particularly sensitive. The engineers who selected that site for a wireless station overlooked nothing in the way of favorable conditions.

### Radio Telephone Suit.

The International Radio Telegraph Company, New York, on May 13, filed a bill of complaint in the United States District Court for the southern district of New York, in its suit against the Western Electric Company, alleging that the latter named company has made, used and sold a large number of radio telephone equipments, infringing United States patents issued to Reginald A. Fessenden as inventor, and owned by the International Radio Telegraph Company.

The three patents concerned are: No. 706,747, applied for September 28, 1901, issued August 12, 1902; No. 727,330, applied for March 21, 1903, issued May 5, 1903; and No. 753,863, applied for September 28, 1901, issued March 8, 1904. The first of these patents describes a system of radio telephony using continuous, or practically continuous, electro-magnetic waves, with means for modifying or changing the character of such waves without interrupting their continuity. The disclosure includes a radio frequency alternator in combination with a microfone modulator as a radio telephone transmitter. This is the pioneer radio telephone patent which figured in the suit brought by the National Electric Signaling Company (predecessor of the International Radio Telegraph Company) against the De Forest Radio Telephone Company in 1909.

Patent, No. 727,330, is a system patent involving signaling by varying the character of radiation at a periodicity independent of the generating force; that is, of the voltage or frequency of the radio frequency oscillation producer. It is stated that this was probably the first disclosure of the so-called "modulated radio frequency" method of wireless telegraphy now in use. The third patent, No. 753,863, is a method patent corresponding to No. 706,747, and describes the method of transmitting by modulating the character of radio waves without interrupting their continuity.

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### Amateur Radio in Canada.

On May 5, the wartime regulations canceling all licenses issued to amateurs for the operation of experimental radio stations throughout the Dominion, were rescinded. Before the war there were 110 amateur radio telegraph stations licensed in Canada.

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### Canadian Naval Radio Stations.

During the war the Canadian Naval Service erected four stations equipped with direction-finding apparatus on the Bellini-Tosi principle, for the purpose of locating enemy naval craft and as an aid to friendly shipping. These stations are located at Cape Sable, Nova Scotia; Shebucto Head, at the mouth of Halifax Harbor; Cape Canso, and at Cape Race, Newfoundland. These stations are now being operated in the general interest of shipping.

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### French Colonial Wireless.

The *French Economist* states that outside of the mother country there are thirty-five French radio-telegraphic stations in service, twenty-five in course of construction and twenty others projected. These include installations in Algeria, Madagascar, the Congo, Timbuctoo, Indo-China and the other colonies. The unexecuted project of encircling the globe by a chain of wireless posts in French territory, reaching from the South of France and Tunis to the Marquesas Islands, thence under the Pacific to Central America and Martinique, is said to be quite feasible. The Eiffel Tower sometimes receives signals from Panama, San Francisco and Honolulu, and it makes itself heard in New Zealand.

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IN VIEW OF the growing importance of radio telegraphy, telegraph, submarine cable, and telephone engineers, wire chiefs and students should plan to join the Institute of Radio Engineers, in order to receive the regular technical publications of the Institute, thereby keeping abreast of the times. Those who desire to become members should communicate with Donald McNicol, editor of TELEGRAPH AND TELEPHONE AGE, and application forms will be sent them.

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### Experimental Wireless Stations.

EXPERIMENTAL WIRELESS STATIONS. By Philip E. Edelman, 272 pages; 98 illustrations.

This book is intended particularly for experimenters in wireless telegraphy as a guide to a rational study of the art. One of the main objects of the book is to provide a standard design for so-called amateur stations, to take the place of the many varieties of hit and miss apparatus constructed and purchased by experimenters.

The matter has been written with particular regard to clearness, simplicity and direct usefulness, and among the subjects covered are: Nature and theory of wireless transmission; aerials; grounds and lightning protection; general features of transmitters; resonance; calculation of wave length, capacity and circuit; transformers; spark coils; transmitting condensers; design and construction of spark gaps; detectors; solid rectifiers; tuning; interference prevention; right of the experimenter, etc. A supplement contains much matter of value, which brings the book up to date and explains the audion, time signals, balancing aerials, vacuum valves, amplifiers, etc.

Copies of this book may be purchased for $1.50 each from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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GUY K. BROWNING, United Press telegrapher in Wilmington, Del., was the subject of a column sketch in the Wilmington *Star* of May 4.

### The Audion in Telegraphy.

The adaptability of the audion, originally invented for the purposes of radio signaling, to the uses of land line telegraphy and telephony has awakened interest in the design and operation of this highly ingenious device.

There is a great amount of published matter on the subject, but those who take up the study, quickly become involved in an array of names such as audion, pliotron, dynatron, oscillation valve, audiotron, amplifier, thermionic relay, ultraudion, thermotron and oscilaudion, and it is necessary to delve through many books and papers in order to gain a correct understanding of the significance of the various terms used.

In the November 1, 1917, issue of TELEGRAPH AND TELEPHONE AGE was published a long article entitled "The Audion Tribe," which describes the uses and characteristics of the various forms of this device.

Copies of this paper may be had for twenty-five cents each.

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### Electrical Education.

A large proportion of the graduates of the large universities which give electrical courses, when they leave college, enter the laboratories of the large industrial companies, and government electrical bureaus.

In the managing, construction and installation departments of operating companies and manufacturing companies there is a growing demand for practical electricians; men qualified to take up the task of getting work done. Telegraph and telephone employees living in towns and cities throughout the country, and who desire to enter the broader fields of the electrical industries, have open to them the thoroughly practical scheme of coming to New York, securing day work or night work in their regular line, and then taking up during their hours off duty a course such as that conducted by the New York Electrical School.

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THOUSANDS OF OUR READERS are seeking an electrical education. They realize that in the contest for supremacy in the business world they cannot know too much. Knowledge is a stock in trade. Experts in electricity have positions with big pay awaiting them. Theo. Audel and Company, 72 Fifth Avenue, New York, advertise on another page Hawkins' Electrical Guides, which explain just what you need to know about electricity. There are ten books to the set, consisting of 3,500 pages, with 4,700 illustrations. Read their advertisement for the contents of each of these ten volumes and you will conclude that this valuable educational matter is obtainable at a nominal price.

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## PROGRESS OF GOVERNMENT CONTROL OF TELEGRAPHS AND TELEPHONES.

That part of the President's message to congress cabled from Paris which refers to the return of the telegraph and telephone lines to their owners says:

"The telegraph and telephone lines will, of course, be returned to their owners, so soon as the retransfer can be effected without administrative confusion, so soon, that is, as the change can be made with least possible inconvenience to the public and to the owners themselves."

The President's reference to the subject in his message has been anticipated by Republican and Democratic Senators, who, irrespective of executive initiative, had measures bearing on the matter ready to offer upon the assembling of congress.

Senator Kellogg of Minnesota offered a resolution May 20 to repeal the existing law under which the wire systems were taken over by the government and to return the systems at once to their private owners. Another resolution to repeal the present law affecting the wire systems was offered by Senator Gore of Oklahoma.

Mr. Kellogg's resolution will be backed by the Republican majority. It was drawn after a conference with Senator Cummins, who is to be chairman of the Interstate Commerce Committee, and who is to offer the bill for restoring the railroads to private control.

Under Mr. Kellogg's measure the President is required to "cause to be made a detailed and itemized account and report of all his acts and proceedings in connection with the supervision, possession, control, and operation" of the wire systems.

The Senate majority wants the wire systems restored to private control at once, and every effort is to be made to push the Kellogg resolution to an early vote.

### MR. VAIL ASKS FOR RETURN OF LINES.

Theodore N. Vail, president of the American Telephone and Telegraph Company, and G. W. Robinson, president of the United States Independent Telephone Association, on May 19, addressed a communication to the members of the Senate and House of Representatives, asking that the lines be returned as speedily as possible. The text of the appeal follows:

"To the members of the Senate and House of Representatives:

"On midnight July 31, 1918, under the authority of congress for war purposes, the President took supervision, possession, control and operation of the telephone systems of the country and has since operated them. The war has practically ceased. The public press is strongly demanding, the general public and the owners of the telephone properties are urging that they be returned as speedily as possible, that former conditions may be restored and more satisfactory service be afforded.

"The President and the Postmaster General have announced that this will be done as soon as adequate arrangements be provided for receiving and advantageously operating them. It remains only for congress to enact such legislation as speedily as possible.

"The expenses of these systems have largely increased during the past year, for wages alone at the rate of more than $20,000,000 per annum. This was inevitable and necessary by reason of larger proportional increases by the railroads and industries of the country. The revenues are inadequate to care for such increases, and the deficit of the government on that account to date is largely and steadily increasing. The Postmaster General ordered that steps be taken to secure adequate revenue, but contention with the regulatory authorities of the states, not yet settled, have prevented such adjustments.

"If such conditions continue necessarily the credit of the operating companies will be impaired, proper expenses cannot be met, the best operating forces cannot be retained, needed extensions and satisfactory service cannot be provided.

"A deterioration will ensue which in some localities may threaten a recurrence of public ownership or operation in order to care, even inadequately, for public needs. By prompt action congress can prevent this contingency.

"Just and speedy settlements should be made for all properties taken under the existing law, that balances now in the possession of the government may be restored to assist in the upbuilding and extension of the various systems for better public use. The conditions and regulation of operation should be clearly defined so as to permit the companies to reëstablish and maintain a satisfactory service with reasonable rates without discrimination and procure the benefits of legitimate competition. The principal operating companies of the United States are vitally interested in co-operating with Congress and the officials of the government to accomplish these results.

"THEO. N. VAIL,
"President, American Telephone and Telegraph Company.

"G. W. ROBINSON,
"President, U. S. Independent Telephone Association."

### MR. BURLESON'S RECOMMENDATIONS.

Recommendations of the Wire Control Board that legislation returning the telephone and telegraph systems of the country to private ownership, provide co-ordinated operation of the various systems and fixing of rates by the Interstate Commerce Commission were forwarded May 22, by the Postmaster General to the House Post Office Committee.

The board's recommendations also include creation of a tribunal to hear all controversies between employers and employees, and provide that changes in wage schedules shall not become effective until

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submitted to the Interstate Commerce Commission, so that corresponding changes may be made in rates.

Mere return of the wires to their owners will not solve vexatious problems confronting the companies, Mr. Burleson said in a letter to Representative Moon, of Tennessee, ranking Democratic member of the committee. Extraordinary costs of operation and maintenance "fastened upon them as a result of war," the Postmaster General said, "will continue for some time after control passes from the government."

GOVERNMENT AID ADVISED

"Because of these extraordinary changes in the operating conditions of these properties," the letter continued, "a serious responsibility rests upon the government to adopt every means possible consistent with sound policy to protect the public and enable owners to operate their properties.

"The members of the Board are unanimously of the opinion that in order to provide the most efficient wire service the various service systems should be co-ordinated as to operation. This does not require monopoly of ownership, but is necessary so there can be a consistent and harmonious regulatory policy. Through this means only can the attempts at wasteful competition and the economic loss occasioned by duplications of plant and force be avoided.

"It is believed that this is desirable and can be reached by amending the law so as to provide, subject to the approval of the Interstate Commerce Commission, that any telegraph and telephone company doing an interstate business may purchase the property of any other telegraph or telephone company, or consolidate with any other company or pool traffic, under provisions which will protect the public.

"Hence it is believed that the law should be so amended as to empower the Interstate Commerce Commission to fix rates for telegraph and telephone companies subject to provisions of the act, and that any company whose lines are located entirely within a state, but which transacts direct interstate business, should be made subject to the act."

The commisison's use of its rate-making power, the letter said, would insure the companies sufficient revenue to "yield a reasonable return on the value of property," and also to give proper service.

PRESIDENT MACKAY'S COMMENTS.

On May 24, Clarence H. Mackay, president of the Postal Telegraph, and Commercial Cable companies sent letters to members of Congress urging immediate passage of the bill providing for the return of the lines to their owners. His letter, in part follows:

"Mr. Burleson proposes that any telegraph or telephone company may purchase any other telegraph or telephone company, or consolidate, or pool their traffic. It would take just about twenty-four hours for the American Telephone and Telegraph Company and the Western Union Telegraph Company to get together under any such act of Congress. The voice is the voice of Mr. Burleson, but the hand is the hand of Mr. Vail (president of the American Telephone and Telegraph Company). Six years ago the present administration broke up just such an attempted monopoly by forcing the Western Union and the American Telephone and Telegraph companies to separate. Mr. Burleson now proposes to reestablish that monopoly. What he and Mr. Vail are aiming at is to wipe out the competition of the Postal Telegraph and Commercial cables and to prevent the Postal Telegraph-Cable Company from making the 20 per cent reduction in the telegraph rates.

"This country knows what a monopoly is in the telegraph business, because it had such a monopoly by the Western Union prior to 1884, when the Postal Telegraph-Commercial Cable system came into existence. It formerly took twenty-four hours to send a telegram to California and get a reply. The deteriorating service and the increasing rates during the past ten months of control of the wires by Mr. Burleson and Mr. Vail show what the country would have to endure if the communications were allowed to pass into the control of one man or set of men."

## Extension of the Italian Telephone System.

Steps are now being taken by the Italian government to remedy the deficiency which has long existed in the matter of telephone facilities. The minister of posts and telegraphs has just authorized the provincial governments, provided they have 70 per cent. of communes unprovided with telephone service, to issue bonds jointly with the communes and also with districts having a population of not less than 1,000. These bonds will mature in twenty-five years, and under certain circumstances also in fifty years. The circular authorizing these issues emphasizes the degree to which the burden of administration will be lightened by telephone communication between the provincial and communal governments.

The following figures indicate the number of telephones in the different European countries per 100 inhabitants: Norway, 3.40; Switzerland, 2.22; Germany, 2.10; Great Britain, 1.70; France, 0.80; Austria, 0.60; Italy, 0.26.

## New Head of German Telegraphs.

Hans Bredow, an expert radio engineer, has been appointed director of the German government telegraph system. Bredow was formerly a director of the Telefunken Radio Company. This is the first occasion when an engineer has been placed at the head of the German telegraphs; heretofore the position has been filled by the appointment of junker bureaucrats.

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# Ocean Cable Receiving Instruments

## The Gulstad Relay, Brown "Drum" Relay, and Heurtley Magnifier

### THE GULSTAD VIBRATING RELAY.

Although it is now nearly twenty-five years since this type of vibrating relay was invented by K. Gulstad, chief engineer of the Great Northern Telegraph Company, Copenhagen, Denmark, it seems there are many telegraph engineers who are not familiar with its principles.

The accompanying illustration, Fig. 1, shows theoretically the wiring of the Gulstad relay.

This relay is much more sensitive than any ordinary type of polarized instrument and is said to be less subject to disturbances from extraneous sources. If the wiring is traced it may be seen that when the tongue, or armature, has been placed in contact with either its right or left stop screw, current from the local battery will keep the tongue in constant vibration. By varying the electrical constants of this local circuit the speed of vibration of the tongue may be adjusted within certain limits. When used in cable operation the speed of vibration is adjusted to a value not in excess of the prearranged dot signal speed of the particular cable in circuit.

The incoming cable signals are required only to hold the tongue to the left or the right in response to dot or dash impulses. The incoming cable currents traversing the main winding of the relay coils overpower the magnetizing current produced by the local battery, and, during signal intervals, prevent the tongue from vibrating. Between cable impulses, or when the cable current falls in strength below that of the local current, the tongue resumes its vibrations. It will be seen that the cable current is relieved of the work of starting the tongue from its stop position and of moving it to the opposite contact; being required only to hold it in either position once it is moved to that point.

It is true that the amplitude of the current in forming dot signals is very small. However, even when the incoming dot impulses are unable to control the tongue, the vibrations due to the local battery will perform the service intended; the dashes having sufficient amplitude to register correctly.

This type of relay is applicable only to double-current Morse signaling, and it is reported to be efficient on all land lines and submarine cables where the KR is from 0.5 to 0.75 second.

The fact that the relay is more sensitive to low current impulses than ordinary relays and at the same time less subject to disturbance from induced currents is explained as follows: Consider a line with no current present; when the tongue of the relay comes into contact with one or the other stop, a condenser is charged through one of the auxiliary windings, pressing the tongue momentarily against a stop. Then, the condenser being charged, the current rises in the opposite auxiliary winding through an external resistance and pulls the tongue in the opposite direction, when the discharge current from both auxiliary windings kick it smartly against the opposite contact. The same cycle of operations is then repeated from the opposite pole of the local battery. In this way the armature is set continuously in vibration, making firm contacts and clean breaks at each turn.

In practice, therefore, the resultant effects of the cable impulses and the local currents in the relay windings is that where incoming dots are to be recorded the vibrations are permitted to continue, and where dashes or spaces occur the vibrations are damped out, and the short or long contacts of the armature against its stop screws are registered on the receiving tape.

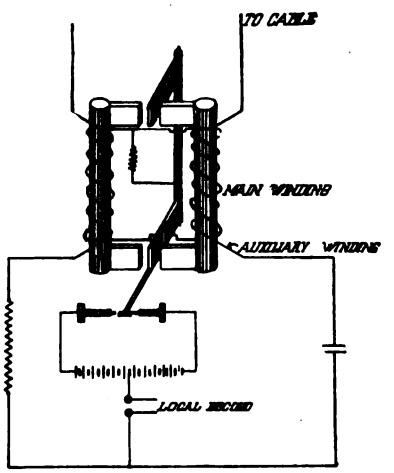


FIG. 1.

On submarine cables between England and Sweden, employing the Gulstad relay a speed of 120 words per minute has been obtained, and in month to month working a speed of 90 words per minute has been maintained.

### THE BROWN "DRUM" RELAY.

Up to a few years ago it had been found impossible to automatically repeat from one submarine cable to another when the cables exceeded a few hundred miles in length. For this purpose the primary necessity was a sufficiently sensitive relay and one which was sure in its contact.

The discovery of the principle of the cable relay herewith described was made by Mr. S. G. Brown, working in conjunction with Messrs. Taylor and Dearlove, of London, England, when he found that good electrical contact could be made and maintained by pressing the end of the relay tongue upon the surface of a divided plate and that frictional

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resistance to side motion of the tongue could be reduced by moving the plate under the tongue or by moving the tongue over the surface of the plate, the movement being maintained in the direction of the length of the tongue.

If this fact is clearly understood, many ways of arranging such a relay will suggest themselves but it was considered that for permanent use, and where the greatest sensitiveness is required, nothing is better that a rotary drum, the drum being divided into three insulated sections, the outer ones being joined up to relays.

Having secured the relay, the next step was to work it through a cable, and to do this two main difficulties had to be faced—that is to say, "variable zero" had to be overcome and some effective means of curbing and controlling the motion of the suspended coil of the relay had to be found.

The variability of zero, which, unless special means are provided for its elimination, always occurs in cable signals when receiving condensers are employed, is of little or no importance if the siphon recorder is used as the receiving instrument, but is fatal to the working of a relay of any form.

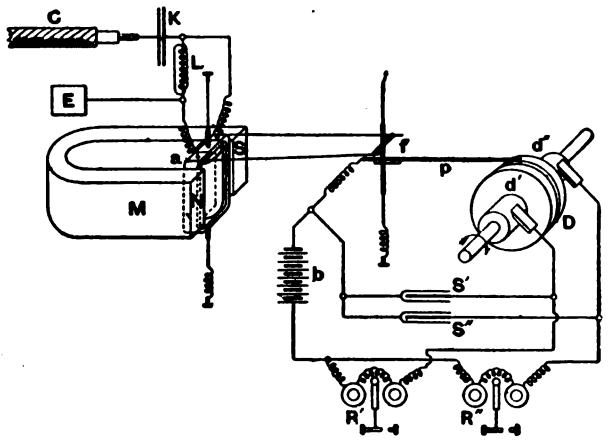


FIG. 2.

In the first experiments over the Gibraltar-Porthcurnow cable of the Eastern Telegraph Company, the variability was overcome by placing a high resistance shunt across the receiving and transmitting condensers, but this method was not found quite practical, owing to the fact that earth-currents were not entirely excluded by the shunted condensers. The consequence was that the earth-current temporarily upset the adjustment of the relay, and this mode of working was objected to by the company. For this reason another method, which in practice has been found entirely satisfactory, was devised for compensating the effects of variable zero.

The second difficulty, the want of curbing and controlling action on the suspended coil, was overcome by the employment of a special design of magnetic shunt coupled in parallel with the relay coil.

The combination gives an apparatus as sensitive and as rapid in its action as the siphon recorder, but, unlike that instrument, able to control a comparatively large external power, by means of which signals can be transmitted to a second cable, or paper strip can be punched by an automatic perforator, as found expedient.

On short cables hand sending is quite possible with the apparatus already referred to, but it is here assumed that at the originating station an automatic transmitter is employed.

It may be well to call attention to the fact that, when a cable is worked at its highest practicable speed, many of the originating impulses are obliterated from the received signals whenever successive impulses of the same polarity occur. It is therefore evident that, if the impulses sent by the relay apparatus into the second cable are to be identical in character with those sent into the first, it is necessary to reproduce the missing beats.

The instrument used for this purpose is called the "interpolator," and its action resembles that of the automatic transmitter at the originating station, with this difference, that the movements of the transmitting levers, instead of being governed by the perforations in the punched tape or strip, are governed by the motions of the relay tongue. The interpolator sends into the second cable impulses similar to those entering the first cable, and these may be either curbed or plain as required. To use this instrument to the best advantage it is necessary that it should run in approximate synchronism with the automatic transmitter at the originating station, and that the speed of the last-named instrument should be nearly uniform.

The perforator when used, reproduces on punched tape a facsimile of the message on the punched tape used at the originating station, and the copy is immediately available for forwarding by the regular automatic transmitter. By the use of the auto-perforater it is possible for a single short cable to feed two long ones, and vice versa, with a minimum of delay.

Referring to Fig. 2, the construction and operation of the drum relay are as follows: The instrument resembles the siphon recorder so far as the moving coil S, and the permanent magnet M, are concerned. An incoming cable impulse, say positive, passing through the suspended coil deflects the coil to the right, which movement is, by means of two silk fibers communicated to a "tree" as illustrated, which in turn controls the movements of a lever P, causing the latter to move off the insulated segment D, of the drum, and into contact with metal section d', thus closing a local circuit including a local battery and the coil windings of a polarized relay R'. When an impulse of the opposite polarity is received, the suspended coil is turned to the left, resulting in the movement of P, to the left, into contact with metal section d'' of the drum, which in turn closes a circuit through the local battery and polarized relay R''. The drum is rotated mechanically at the rate of about 150 revolutions per minute. It will be noted that the drum is made in three parts, consisting of two outside (the dot and dash making contacts) and a center

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insulated section upon which the lever normally rests when the suspended coil is not energized by current passing through it.

It is plain that the local contact points of the polar relays thus operated may be employed to open and close secondary circuits which may include reading sounders or repeater transmitters.

The continuous rotary motion of the drum aids the lever pointer to slide or "skate" to the left or the right in response to the movements of the suspended coil. The friction encountered is, therefore, less than it would be were the drum held stationary. Owing to the light pressure contact existing between the lever point and surface of the drum, the electrical resistance varies somewhat and at times is quite high. To overcome this difficulty and in order to insure that at all times a sufficient current value will obtain in the relay circuits to operate those instruments properly, condensers S' and S" are connected around the drum contacts. Another advantage of the condensers is that sparking and its related ill effects are reduced to a minimum. Each of the condensers has a capacity of two microfarads.

On short cables and where ordinary cable transmission is employed, a 30-ohm shunt having large self-induction is connected around the winding of the suspended coil, the presence of which produces a controlling and curbing effect upon the movements of the coil, resulting in clearer definition of signals.

The interpolator, previously mentioned, consists of two distinct mechanical and electrical devices, one for sending dots and one for sending dashes. When a letter h is received over a long submarine cable by means of drum relay the tongue remains in contact with the dot side throughout the entire four beats of the letter, simply producing one long contact on the dot relay. By means of the interpolator this long signal is split into its constituent parts and transmitted as four dots.

### THE MUIRHEAD RELAY.

The Muirhead cable relay consists essentially of a siphon recorder, the moving vane of which causes a gold wire to oscillate backward and forward between two silver pegs, with which it comes in contact. A movement to one side signals a dash and a movement to the other a dot. The contacts being made of silver and gold are not oxidizable, and produce a more positive contact than other metals. The Muirhead relay is now in use on certain of the transatlantic submarine cables extending between Nova Scotia and England.

### THE HEURTLEY MAGNIFIER.

This relay, the invention of E. S. Heurtley, is in use on many of the long submarine cables of the world. The instrument resembles somewhat the siphon recorder, but the movements of the receiver coil do not act upon the writing siphon. Instead the coil actuates a very light lever of glass, over which a bronze wire is stretched. The glass tube serves only to stableize the bronze wire. See Fig. 3. Two fine platinum wires are fixed at the end of the glass tube. In the normal position of the glass lever these fine wires are cooled by an air-current which acts over the entire length. When both wires are equally cooled the resistances of the wires remain equal, and in the bridged recorder circuit no current flows.

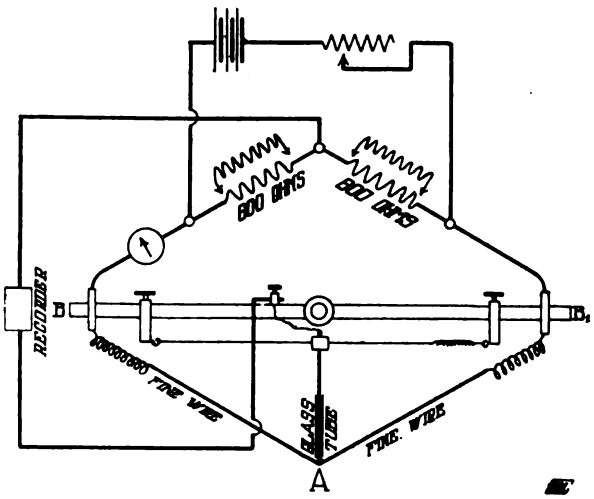


FIG. 3.

Fig. 3, shows the electrical connections of the Heurtley magnifier, local circuits. When a signal impulse arrives the glass tube will move, the point A, will change its position, and as the cooling air is passed through a narrow slit the fine wires escape the air-blast. As the resistance of the wire changes due to altered temperature a current flows through the recorder coil registering the signal. The cooling slit is so arranged that with the movement of A in one direction one wire escapes the cooling effect of the air, while by movement in the opposite direction the other wire escapes.

### SQUIER AMPLIFIER ARRANGEMENT.

The possibility of applying radio-telegraphic methods for the reception of cable signals was suggested about two years ago by Major General G. O. Squier, chief signal officer of the United States army. It was found that the ticker and the audion, the most sensitve detectors of high frequency currents are also suitable as detectors of low frequency and direct currents.

The function of the ticker is simply to interrupt the current a large number of times per second, producing an audible note, which is then detected in an ordinary telephone receiver associated with it in the usual way. An audion amplifier may be interposed through transformers between ticker and telephones, thus greatly amplifying the signals.

In Fig. 4, at A, and B, are shown circuit arrangements for cable receivers based on this principle. F is the filament of the audion, and B, the filament battery.

In one case where the ticker alone is employed the interrupted current of the received signal is directly audible in the telephones, while in the other

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cases, the arrangement shown at A, an audion amplifier is introduced to further increase the sensitiveness. In either case to get the best results it was found necessary to use the reversal method. The simple Morse code was used, and the sending key so arranged that for every successive signal the current was reversed.

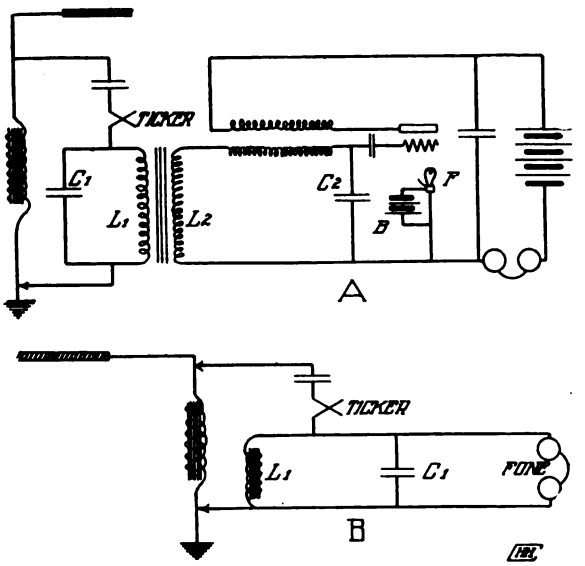


FIG. 4.

The inductances and capacities of the circuits marked $L_1C_1$ *and* $L_2C_2$ are adjusted to be in resonance for the frequency of the interruptions produced by the ticker. With the arrangements of the circuits shown in the diagrams a remarkable degree of sensitiveness was obtained. One dry cell at the transmitting end was sufficient to produce clear signals.

This method of receiving cable signals is applicable to the Squier system of cable telegraphy, where an unbroken alternating current is used, as well as to Morse signals by the reversal method.

In TELEGRAPH AND TELEPHONE AGE of April 1, 1919, appeared a complete description of the ocean cable amplifier invented by Thomas B. Dixon, using selenium cell relays.

### Submarine Cable Testing.

We have received a supply of "Darby and Fisher's Students' Guide to Submarine Cable Testing." fifth edition, one of the most popular books on this important subject.

The book contains 240 pages and deals with all tests and measurements made in modern submarine cable practice. An appendix is included which contains answers to all questions presented in the main work.

The price of the book is $4.50 and copies may be had from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

## INVISIBLE LIGHT FOR SIGNALING PURPOSES.

Owing to the visibility of most sources of artificial light, we are accustomed to regard light itself as a visible entity, whereas such light sources as flames, incandescent filaments, and the like, are only visible by contrast with their backgrounds or surroundings, and the illumination they shed is made evident by reflecting surfaces, shadows, etc. Most readers who have attended science classes will be familiar with the simple experiment to demonstrate the invisibility of light, in which a beam of sunlight, passing through a small opening in a blind or shutter into a darkened room, is intercepted by a red-hot poker or other hot object, which burns the dust particles in its immediate vicinity and creates a dark space in the beam, proving that the visibility of the beam itself is only due to the solid particles floating in the atmosphere.

Signaling by heliograph in daylight, or flash-lamp after dark, is familiar to all who have practised the methods of the various army and navy signaling sections, but it will be realized that the concentrated and directed beams thus made use of for transmitting Morse signals over distances can be intercepted or picked up by unauthorized persons, are, in fact, visible to all and sundry by reason of the fact that both source of light and reflector are usually exposed, and the beam itself is made visible by floating dust particles in the air through which it passes.

How these disabilties were overcome and the necessary secrecy obtained while signaling by light beams was the subject of a demonstration by Prof. R. W. Wood before the Physical Society of London, on March 14 last. The first device shown was a signaling lamp, consisting of a 6-volt electric bulb with a specially coiled filament, located at the focus of a three-inch lens. The result was a very narrow beam, only visible in the immediate neighborhood of the observation post to which the signals were directed. To ensure accuracy of direction, an eyepiece was fitted behind the filament, thus converting the apparatus into a telescope which could be accurately directed upon the observation post for which the signals were intended.

Even this narrow beam in certain circumstances might prove visible, in which cases light filters were employed to cut out the visible spectrum. By day a deep red filter, transmitting only the extreme red rays, was interposed between the lamp and the observation post, thus making the light source invisible to any observer unless he was provided with a similar red screen to cut out the daylight, in which latter case signals could be read at no less than six miles distant. By night a screen was employed which transmitted only the ultra-violet rays. The observing telescope was fitted with a fluorescent screen in its focal plane, also giving a range of some six miles.—*Electricity.*

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# Telephone Receivers in Radio Signaling

In the United States the days of the coherer and tape register were followed by the introduction of radio receivers such as De Forest's "responder," Fessenden's "liquid barreter," and Dunwoody's "carborundum detector," all of which permitted the use of telephone receivers in place of registers as reading devices. In the early days (1902-1905) the standard De Forest receiver was a single fone with head band, and wound to 200 ohms resistance. The first good receivers for radio work manufactured in this country were made by W. C. Getz, a telephone engineer and radio amateur, about the year 1906. (Getz later died in the Philippine Islands while in government service.)

The Getz receivers were of the head-band, double fone type, were wound with No. 40 or No. 50 wire, and were fitted with a special, thin diafram, which Getz named the "gold" diafram. These receivers were wound to a total resistance of 1,000 or 2,000 ohms as desired.

Following Getz, Brandes of New York commenced the manufacture of radio receivers, and these are still being manufactured in grades for both amateur and professional purposes. Various other electrical manufacturing companies also took up the work of designing and supplying high grade telephone receivers for radio work, and many improvements have been made in the art of telephone receiver design.

Both radio telegraphy and radio telephony have made their greatest strides since the introduction of the audion in conjunction with the telephone as a receiving system; but it is interesting to observe that, in one way or another, the telephone receiver has been used in wireless work since 1898—perhaps earlier.

On August 16, 1898, Prof. Blondel, of Paris, in a sealed communication deposited with the Academy of Sciences, and which was entitled "Improvements in Wireless Telegraphy," described an arrangement of detector circuits employing a telephone receiver. Also, in Marconi's long distance experiments of 1901 a telephone receiver was employed.

In recent years many attempts have been made to produce telephone receivers which, for radio purposes, would be improvements over the type of receiver used in ordinary wire telephony. One of the earliest was that of S. G. Brown, in England, employing a vibrating member comprising a steel reed and a light, conical aluminum diafram, attached at its center through the reed and at a short distance from the core axis. The idea was to provide a tuned vibrating member, or set of members, which would respond to various periodicities as desired.

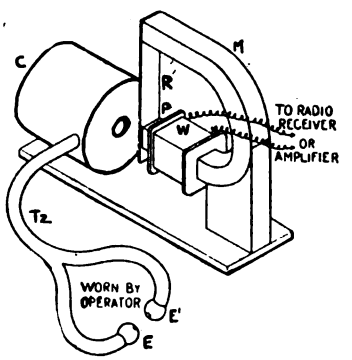
Various other well-known types have been developed, such as the Pierce dynamometer telephone, the Baldwin receiver, the thermal receiver, the Berger "monotone" receiver, the Fessenden "heterodyne" receiver, and the Ader, and Goloubitsky receivers used in European countries.

During the late war the Signal Corps of the American army conducted exhaustive experiments with the object of providing a type of receiver especially adapted to radio signaling.

RADIO TRANSLATOR.

Major Charles A. Culver, of the Signal Corps, recently described a receiver which was developed in the field laboratory and which he stated is a promising device for the elimination of extraneous disturbances, including interference from other stations. The device consists of a tuned reed associated with an electro-magnetic system, and an external acoustic resonating chamber.

FIG. 1.



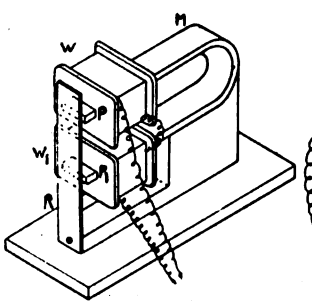




FIG. 2.

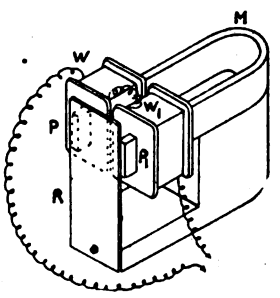



FIG. 3.

The device is illustrated in the accompanying diagrams.

In explaining the design of and operation of this new instrument Major Culver said:

"The telephone receiver commonly employed in connection with radio reception is incorrectly designed for use in radio work. The telephone receiver was originally constructed to reproduce the voice with its many overtones, hence the diafram is

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highly damped and has a comparatively flat resonance curve. The result of such a construction is that X and other extraneous impulses excite the diafram, as well as the signals themselves. The signal impulses from a radio receiving set closely approximate a monotone; that is, the signal tone is comparatively free from overtones or upper partials. Quality or timbre therefore need not be considered in arranging to translate these electrical impulses into audible sounds. It therefore becomes possible to design a translating device for use in radio which will be highly selective with respect to signal tones and which will respond but feebly to impulses out of resonance with the vibratng member.

"Proceeding along the lines just indicated, the device referred to in the second paragraph has been developed. By the use of a comparatively stiff steel reed, R, Fig. 1, of the proper coefficient of elasticity, and fastened at one end only, the so-called "musical effect," of the X's, commonly present in other similar devices, is very much reduced. The proper mechanical relation of the resonant chamber, C, to the reed is important. Energy from the resonant chamber is conveyed to the ears of the operator by means of short rubber tubes similar to those of a stethoscope. The device is exceedingly simple and robust. It is preferable to enclose the resonant chamber and the electro-magnetic parts in such a manner as to prevent extraneous noises and air currents from acting upon the resonant chamber. The efficiency of this device, which might be called a radio translator, is not as high as the best receivers used for radio purposes, but repeated tests show that the ratio of the X's to signals is materially improved by the use of this apparatus, and high when using the radio translator in connection with two-step amplification, for comfortable reading. The use of the new device makes it possible to reduce the ratio in practically all cases at least to unity.

"Aside, however, from the possible utility of this device in connection with the reduction of the effects of vagrant extraneous disturbances, the apparatus should prove to be of considerable utility in preventing interference from nearby high power continuous wave or spark stations. Its performance in this respect has been very satisfactory. Owing to the fact that the device consists essentially of a double filter, it has been found by actual tests that wave lengths differing by at least 1 per cent. can be completely shut out. It has also been found that this receiver, when used for the reception of spark signals, smoothes out the spark tone into a clear musical note.

"Owing to the fact that the final design of the radio translator was not completed until about November 1, 1918, it was not possible to give the device a trial at the several receiving stations, but practical tests made at the field laboratory, extending over a period of a number of weeks, have shown that the invention of this apparatus marks a distinct advance in the means designed to overcome the interference in radio communication."

## NEW DEVELOPMENTS IN MULTIPLEX TELEGRAPHY AND TELEPHONY.

After a long period of development work and experimentation, the New York to Harrisburg, Pa., section of the American Telephone and Telegraph Company's cable between New York and Chicago is to be phantomed and composited, using vacuum tube repeaters. The installation of duplex cable telegraph repeater apparatus to operate on a maximum current of five milliamperes, with batteries aiding, has been started at New York, Philadelphia, and Harrisburg. To extend these circuits to Chicago prior to the completion of the cable between Harrisburg and Chicago, high frequency carrier telegraph apparatus is being installed at Harrisburg and Pittsburg, Pa., and Morrell Park, Ill., with vacuum tube repeaters at Beaver Dam, Ohio.

A. J. Eaves is the engineer in charge of the installation of the telegraph apparatus. Mr. Eaves is the inventor of several telegraphic devices and systems which have been in daily use during the past seven or eight years.

### Belgian Telegraphs and Telephones.

When the Germans destroyed the telephone system of the country, they calculated that it would take two years to restore it. The two chief central exchanges at Brussels were entirely removed, and the third was destroyed. The heads were cut off 50 underground cables, each made up of from 200 to 400 wires, while separate wires were cut in several places in such a way as to make them especially difficult to repair. Equipment was torn down and removed; one of the big "multiples" was entirely destroyed. The whole telephone installation will have to be rebuilt; the work is going on.

Exchanges in other towns have suffered the same fate. The wires in private houses have been cut, and in many cases the instruments have been removed. The same conditions prevail at the Central Telegraph Office. The great switchboard serving as an exchange for the whole of the country was stripped. The main instrument room was left empty. At the end of March there was no cable communication with England, except by way of Holland and France. There was only one wire working between the French frontier and Paris. It was four and a half months before the Germans succeeded in discovering, although it had been laid by Siemens, how the Belgians had managed to keep the underground telephone line from Antwerp working for days after the occupation.

Two MESSENGER BOYS learning to telegraph were practicing over a wire between two branch offices and one of them was overheard remarking that "The W. U. boys have got a baz bam club and are going to play a gag with the Postal."

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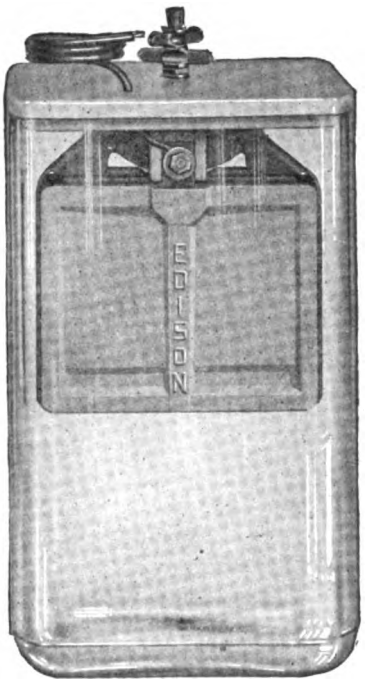
# FOR CLEAR TRANSMISSION

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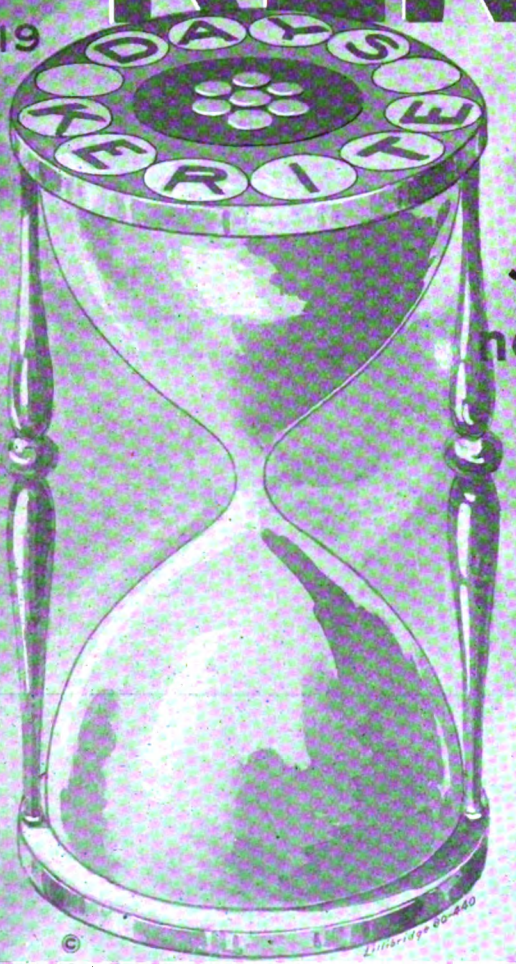

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## THE RAILROAD.

ELLIS E. DILDINE, superintendent of telegraph, Northern Pacific Railroad, St. Paul, Minn., was a New York business visitor May 16 and 17.

R. F. MACFARLANE, formerly inspector of the Erie Railroad at Huntington, Ind., has returned from France, and has been re-appointed to his old position, relieving H. A. Daake, assigned to duties on other divisions of the railroad.

THE OFFICES OF the Telegraph and Telephone Section, United States Railroad Administration, have been moved from room 625, Southern Railroad building to room 1004, Hurley-Wright building, corner of 18th Street and Pennsylvania Avenue, Washington, D. C.

### Electricity and Magnetism.

A First Book of Electricity and Magnetism, by W. P. Maycock, is a work which constitutes a thorough course in elementary electrical engineering. The book is pocket size and contains 350 pages, covering in an instructive manner all of the principles concerned in the design and operation of electrical instruments. One especially valuable feature of the book is a section on electrical experiments which enables the student to develop and prove the theories discussed throughout the text of the work.

The price of the book is $1.25, and copies may be purchased from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

### First Principles of Electricity.

The above is the title of a new book by J. E. Homans, which contains 248 pages of up to date matter relating to elementary electricity and magnetism. In addition to revised matter covering elementary principles the book includes detailed descriptions of electric wiring, alternating currents, polyphase wiring, motors and generators, armature and field windings, synchronous motors, rotary converters, transformers, etc.

Students who have only an elementary knowledge of arithmetic will have no difficulty masterng the subjects covered in this useful work.

The price is $1.25 per copy, and it may be obtained from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

THE J-C REPEATER, manufactured by the Jester-Cooper Company, Houston, Texas, requires no local battery in its operation. It is of the simplest construction, thus requiring the simplest adjustment. The object of this repeater is maximum efficiency with a minimum of maintenance. Those who are interested in this make of repeater should send for descriptive literature.

## CANADIAN NOTES.

C. STEWART is traffic supervisor, Great North Western Telegraph Company, Toronto.

H. S. INGRAM is inspector of telegraphs, Canadian Pacific Railway Company's Telegraphs, with headquarters at Toronto, Ont.

THE GREAT NORTH WESTERN TELEGRAPH COMPANY, on May 1, opened offices at all stations along the line of the National Transcontinental Railway between Quebec and Winnipeg, for the handling of commercial business.

GEORGE C. VAUDRIN, formerly of the Great North Western Telegraph Company's Montreal main office, has been appointed manager at Quebec City, vice W. T. Leslie, resigned.

HONOR ROLL No. 42 of the Canadian Pacific Railway shows the names of the following telegraphers: Charles H. Jack, wounded in action; Angus D. McGillivray, wounded in action; and George S. Slade, wounded in action.

E. W. PECK has been appointed superintendent of the telegraph and telephone department of Armour and Company, with headquarters at Union Stock Yards, Chicago, Ill., vice D. A. Carroll retired on pension, on May 1, 1919.

GEORGE W. HOYTE, who had charge of the telegraph bureau in the New York Times office, for several years past, and who died a short time ago, was one of the best posted men electrically in the United States. He was a born electrical student and he made good use of his opportunities to study the intricate questions pertaining to all phases of telegraphy. Mr. Hoyte was the first manager of the Postal Telegraph-Cable Company in Chicago. This was in 1882.

"SWIFTY" WILLIAMS, as C. W. Williams of Philadelphia, is best known, is one of the finest telegraph operators in the United States. As a sender the word "swifty" is not an exaggeration.

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ALTERNATING CURRENT SELECTORS
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# RAILROAD TELEGRAPH SUPERINTENDENTS HOLD ANNUAL MEETING IN CHICAGO, JUNE 11, 12 AND 13.

The annual meeting of the Association of Railway Telegraph Superintendents has been called to meet in Chicago in the La Salle Hotel, June 10, 1919, at 2 p. m.

On account of the recent amalgamation of the activities of the Association with the American Railroad Association it is proposed, at this meeting, to suspend the order of business provided in the standing rules, and consider only the future of the Association. A committee appointed by President Clapp has gone into the subject and will have a definite plan to recommend to the meeting, having in view the future of the Association.

The Director General of railroads on January 10, 1919, issued Circular 70, stating that during the period of federal control, and in order to provide an administration channel through which recommendations may reach the Director General, the American Railway Association has revised its articles of organization and by-laws and will change its name to the American Railroad Association.

M. H. CLAPP,

Manager Telegraph Section,
United States Railroad Administration.
Washington, D. C.

J. F. CASKEY,

Superintendent of Telegraph, Lehigh Valley Railroad, South Bethlehem, Pa. Vice-Chairman, Telegraph and Telephone Division, American Railroad Association.

The by-laws have been changed to permit of amalgamating the association's activities with those of the six railroad operating and maintenance associations for many years past conducted by railroad officials of the various departments.

The new organization consists of five sections: 1, Operating; 2, Engineering; 3, Mechanical; 4, Traffic; and 5, Transportation. The activities of the railroad telegraph and telephone superintendents come under the head of operating.

A circular issued March 17 from the office of W. L. Connelly, secretary of the Association of Railway Telegraph Superintendents, and addressed to all members, read as follows:

"On January 10 the Director General of Railroads issued Circular No. 70, stating that the scope of the American Railway Association had been enlarged, its name changed to the American Railroad Association, and that it would cover, during the period of federal control of the railroads, the former activities of our association.

"In view of this circular, a meeting of the executive committee of our association was held in Washington on January 30. After discussing the amalgamation, it was thought that our organization should be maintained intact, but should remain inactive during the period of federal control, and as soon as our work shall have been taken over by the American Railroad Association, a statement should be sent to our membership.

"I therefore desire to advise you that the Telegraph and Telephone Division of Section No. 1—Operating, of the American Railroad Association has been organized and that the committee of direction of this division held a meeting on February 20

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in New York, at which time arrangements were made to take over and handle the former activities of our association in accordance with the circular of the Director General.

"Your executive committee now thinks that further action relative to our association should be deferred until the first annual meeting of the Telegraph and Telephone Division of the American Railroad Association, to be held in Chicago on June 11, 12 and 13, at which time a brief meeting of our association will be held for the purpose of amending the constitution to meet the conditions. Meanwhile a committee has been appointed to draft suitable amendments to the constitution which will be submitted to the membership thirty days in advance of the meeting."

Under the direction of President M. H. Clapp, of the Association of Railway Telegraph Superintendents, who is also chairman of the Telegraph and Telephone Division of the American Railroad Association, a considerable amount of constructive committee work has been done since the Chicago convention of December 5 and 6, 1918.

The tentative regulations prepared for the Telegraph and Telephone Division of the American Railroad Administration, follow:

E. C. KEENAN,
General Superintendent of Telegraphs and Telephones, Eastern Region, United States Railroad Administration, New York.
Chairman, Editing Committee.

F. T. WILBUR,
Superintendent of Telegraph, Illinois Central Railroad, Chicago, Ill.
Member Committee of Direction, and Chairman of Committee No. 6.

H. HULATT,
Manager of Telegraphs, Grand Trunk and Grand Trunk Pacific Railroads, Montreal, Que.
Member Committee of Direction.

J. A. JONES,
Superintendent of Telegraph, Southern Region, U. S. R. A.
(Southern Railroad)
Member Committee of Direction, and Chairman of Committee No. 5.

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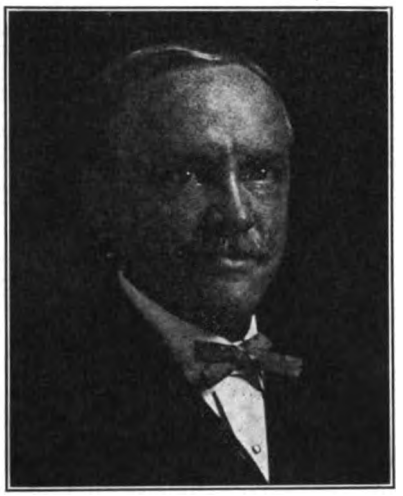
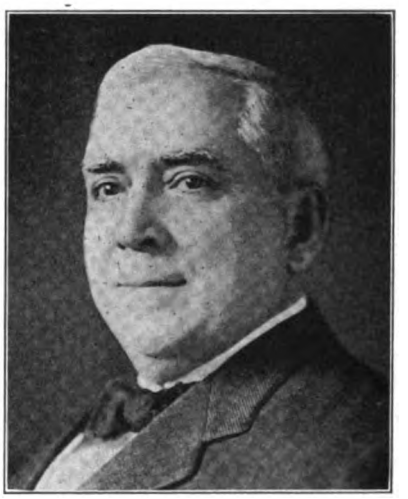
REGULATIONS.

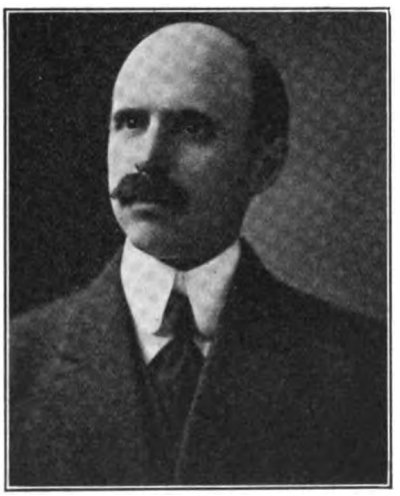
1. The Division shall include those actively connected in official or supervisory capacities with railroad telegraph or telephone service. Affiliated members may be appointed by the Committee of Direction.



E. A. CHENERY,
Superintendent of Telegraph, Southern Region, U. S. R. A., St. Louis, Mo.
Member Committee of Direction.



G. A. CELLAR,
Superintendent of Telegraph, Pennsylvania Lines West. Pittsburg, Pa.



L. S. WELLS,
Superintendent of Telegraph, Long Island Railroad, New York.
Member Editing Committee.

C. STANLEY RHOADS,
Telegraph and Telephone Engineer, Eastern Region, U. S. R. A.
Member Editing Committee.

2. There shall be a Committee of Direction, which shall consist of eleven representatives of members within the Division, including the chairman and the first and second vice-chairmen of the Division, the two past chairmen of the Division last holding office, and six representatives of members.

The Committee of Direction shall conduct the business of the Division, shall authorize, order, define duties, fix the number of and appoint the members of such special committees as may be necessary to investigate and report their findings and recommendations upon any subject to be considered by them. For the present there shall be the following special committees:

Committee No. 1—Construction and Maintence —Outside Plant.
Committee No. 2—Construction and Maintenance —Inside Plant.
Committee No. 3—Protection Against Electrolysis.
Committee No. 4— Protection Against Lightning and Electric Light and High Power Circuits.

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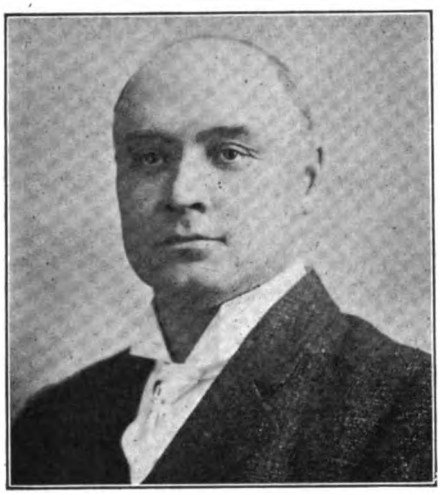
Committee No. 5—Telegraph and Telephone Development.

Committee No. 6—Message Traffic.

3. Regular meetings of the Committee of Direction shall be held in September immediately after the annual meeting of the Section and in March, respectively, of each year, the date and place to be decided by the chairman. Special meetings of the committee may be held at the call of the chairman.

An annual meeting of the Telegraph and Telephone Division shall be held in June of each year, the time and place to be designated by the Committee of Direction at least sixty days in advance. Special meetings may be held at the call of the Committee of Direction.



JOHN McMILLAN,
Manager, Canadian Pacific Railway Company's Telegraphs.
Montreal, Que.

Meetings of any special committee may be held at the call of the chairman of such committee.

4. The officers of the Division shall be a chairman, a first vice-chairman and a second vice-chairman. The nomination and election of these officers, and the six members of the Committee of Direction, shall be annually by ballot and plurality vote shall elect. If a vacancy occurs in any office or in the elective membership of the committee, it shall be filled for the balance of the year by appointment by the chairman, approved by the Committee of Direction. The right to hold office, vote and attend executive sessions shall be vested in representatives of members only.

PERSONNEL OF COMMITTEES.

*Committee of Direction.*

Martin H. Clapp, (chairman), manager, Telegraph Section, United States Railroad Administration, Washington, D. C.

J. F. Caskey, superintendent of telegraph, Lehigh Valley Railroad, Bethlehem, Pa.

Wm. Bennett, superintendent of telegraph, Chicago & Northwestern Railroad, Chicago, Ill.

G. A. Cellar, superintendent of telegraph, Pennsylvania Lines West of Pittsburgh, Pittsburgh, Pa.

E. A. Chenery, general superintendent of telegraph, Southwestern Region, United States Railroad Administration, St. Louis, Mo.

H. Hulatt, manager of telegraphs, Grand Trunk Railway System, Montreal, Can.

J. A. Jones, superintendent of telegraph, Southern Railroad Lines, East, Charlotte, N. C.

E. C. Keenan, general superintendent of telegraph and telephone, Eastern Region, United States Railroad Administration, Grand Central Terminal, New York City.

F. T. Wilbur, superintendent of telegraph, Illinois Central Railroad, Chicago, Ill.

*Committee No. 1.*

*Construction and Maintenance—Outside Plant.*

Martin H. Clapp, (chairman), manager, Telegraph Section, United States Railroad Administration, Washington, D. C.

E. A. Burhitt, general foreman, Illinois Central Railroad, Chicago, Ill.

G. A. Cellar, superintendent of telegraph, Pennsylvania Lines West of Pittsburgh, Pittsburgh, Pa.

E. A. Chenery, general superintendent of telegraph, Southwestern Region, United States Railroad Administration, St. Louis, Mo.

R. E. Chetwood, plant engineer, Western Union Telegraph Co., 195 Broadway, New York City.

G. A. Dornberg, chief lineman, Pennsylvania Lines West of Pittsburgh, Pittsburgh, Pa.

E. C. Keenan, general superintendent of telegraph and telephone, Eastern Region, United States Railroad Administration, Grand Central Terminal, New York City.

J. McMillan, manager of telegraphs, Canadian Pacific Railway, Montreal, Can.

J. J. Ross, superintendent of telegraph, Michigan Central Railroad, Detroit, Mich.

B. J. Schwendt, superintendent of telegraph and signals, Toledo & Ohio Central Railroad, Columbus, O.

L. S. Wells, superintendent of telegraph and Electricity, Long Island Railroad, Pennsylvania Station, New York City.

*Committee No. 2.*

*Construction and Maintenance—Inside Plant.*

R. F. Finley, (chairman), superintendent of telegraph, New York Central Railroad, Cleveland, O.

A. Behner, engineer of telegraph department, New York Central Railroad, Cleveland, O.

J. H. Brennan, superintendent of telegraph, St. Louis-San Francisco Railroad, Springfield, Mo.

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A. W. Douglas, assistant Superintendent of telegraph, Chicago, Rock Island & Pacific Railroad, Chicago, Ill.
I. C. Forshee, electrical engineer, Pennsylvania Railroad, Eastern Lines, Philadelphia, Pa.
George K. Heyer, railway sales engineer, Western Electric Co., 463 West Street, New York City.
R. R. Hobbs, superintendent of telegraph, Louisville & Nashville Railroad, Louisville, Ky.
W. Rogers, telegraph and telephone engineer, Southwestern Region, United States Railroad Administration, St. Louis, Mo.
G. R. Stewart, general wire chief, Illinois Central Railroad, Chicago, Ill.
C. A. Worst, superintendent of telegraph, Chicago, Burlington & Quincy Railroad, Chicago, Ill.
M. B. Wyrick, division plant superintendent, Western Union Telegraph Co. Chicago, Ill.

*Committee No. 3.*
*Protection Against Electrolysis.*

Wm. Bennett, (chairman), superintendent of telegraph, Chicago & Northwestern Railroad, Chicago, Ill.
R. F. Hosford, American Telephone & Telegraph Co., 15 Dey Street, New York City.
P. J. Howe, construction engineer, Western Union Telegraph Co., Room 1915, 195 Broadway, New York City.
L. A. Lee, superintendent of telegraph, Pittsburgh & Lake Erie Railroad, Pittsburgh, Pa.
G. O. Perkins, superintendent of telegraph and signals, Chicago Great West Railroad, 303 West Harrison Street, Chicago, Ill.

*Committee No. 4.*
*Protection Against Lightning, Electric Light and Power Circuits.*

J. F. Caskey, (chairman), superintendent of telegraph, Lehigh Valley Railroad, Bethlehem, Pa.
L. Behner, engineer of telegraph department, Pennsylvania Lines West of Pittsburgh, Pa.
W. L. Cook, president, Reliable Electric Co., 407 South Sangamon Street, Chicago, Ill.
I. C. Forshee, electrical engineer, Pennsylvania Railroad, Eastern Lines, Philadelphia, Pa.
W. M. Gould, American Telegraph & Telephone Co., 15 Dey Street, New York City.
Stanley Rhoads, telegraph and telephone engineer, Eastern Region, United States Railroad Administration, Grand Central Terminal, New York City.
H. A. Shephard, superintendent of telegraph, New York, New Haven & Hartford Railroad, New Haven, Conn.

*Committee No. 5.*
*Telegraph and Telephone Development.*

J. A. Jones, (chairman), superintendent of telegraph, Southern Railroad Lines, East, Charlotte, N. C.
E. E. Dildine, superintendent of telegraph, Northern Pacific Railroad, St. Paul, Minn.
H. Hulatt, manager of telegraphs, Grand Trunk Railway System, Montreal, Can.
B. A. Kaiser, American Telephone and Telegraph Co., 195 Broadway, New York City.
E. L. King, superintendent of telegraph, Southern Pacific Lines, San Francisco, Cal.
David Sarnoff, contracting manager, Marconi Wireless Co., 233 Broadway, New York City.
S. L. Van Akin, Jr., assistant superintendent of telegraph, New York Central Railroad, New York City.

*Committee No. 6—Message Traffic*

F. T. Wilbur, (chairman), superintendent of telegraph, Illinois Central Railroad, Chicago, Ill.
A. C. Adams, assistant superintendent of telegraph, Chicago, Milwaukee & St. Paul Railroad, Milwaukee, Wis.
W. P. Cline, superintendent of telegraph, Atlantic Coast Line Railroad, Wilmington, N. C.
P. F. Frenzer, superintendent of telegraph, Union Pacific Railroad, Omaha, Neb.
W. H. Hall, superintendent of telegraph, Missouri, Kansas & Texas Railroad of Texas, Denison, Tex.
G. D. Hood, superintendent of telegraph, Chicago, Rock Island & Pacific Railroad, Chicago, Ill.
C. S. Rhoads, superintendent of telegraph, Cleveland, Cincinnati, Chicago & St. Louis Railroad, Indianapolis, Ind.

## Program of the Chicago Meeting.

The principal work of the meeting will be the consideration of reports made by the different committees. There are at present seven of these committees, as follows:

Committee No. 1—Construction and Maintenance—Outside Plant.
Committee No. 2—Construction and Maintenance—Inside Plant.
Committee No. 3—Protection Against Electrolysis.
Committee No. 4—Protection Against Lightning and Electrict Light and High Power Circuits.
Committee No. 5—Telegraph and Telephone Development.
Committee No. 6—Message Traffic.
Committee No. 7—Editing.

The work of Committee No. 1 is divided into four parts:

(a) Pole Lines.
(b) Crossings.
(c) Underground.
(d) Transpositions.

The pole line committee will present a preliminary draft of pole line specifications. In some respects this is the most imporant specification that will be presented to the meeting. The pole line specifications recommended are a great advance over the present pole line specifications and it is expected that there will be a great deal of interest shown in connection with these specifications, which, however, are not complete and will not be adopted until some later meeting.

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The wire crossing committee, also will present a report at this meeting.

The underground committee will present complete specifications for the installation of underground conduits for telegraph and telephone cables. This specification is based on a specification first presented to the St. Paul meeting of the Association of Railway Telegraph Superintendents and considered at the meeting of the association in Chicago last December. This specification has been revised, brought up to date and will be presented for final adoption by the Division.

The transposition committee has gotten together a complete set of specifications covering the transposition of telephone circuits which is thoroughly up to date. These specifications cover the location and installation of transpositions, including methods of transposing wires to form both physical and phantom telephone circuits. They also provide methods for transposing telephone circuits, both physical and phantom, to reduce inductive disturbances from power, electric light and telegraph circuits. The specifications make use of the system of transpositions, the materials and the mechanical methods contained in the specifications of the American Telephone and Telegraph Company and the Western Union Telegraph Company. These specifications will be offered for final adoption by the Telegraph and Telephone Division at the Chicago meeting.

Committee No. 2, Construction and Maintenance —inside Plant, will present a preliminary draft of specifications for the installation of telegraph and telephone equipment in railroad offices. These specification are divided into the following sections:

General, Planning, Locations and Lay Outs, Apparatus and Materials, Circuits, and Installation.

These specifications have been gotten together after a great deal of thought and consideration on the part of the committee and will be, when they are placed in final form and adopted, a great help to the railroad telegraph departments in installing telegraph and telephone apparatus.

Committee No. 3, Protection against Electrolysis will present a report in two parts: The first being a general discussion of the matter of protection against electrolysis, from the point of view of railroad cable owners, and the second, instructions for minors offices and maintenance forces. A part of the report of the committee is based on the report of the same committee presented to the Association of Railway Telegraph Superintendents at the St. Paul meeting. This form of report, however, has been thoroughly revised, brought up to date and certain additions made.

Committee No. 4, Protection Against Lightning and Electric Light and Power Circuits, has placed in final form the report of the same committee presented to the annual meeting of the Association of Railway Telegraph Superintendents, held in Chicago in 1918. Also, with view of making recommendations as to the methods of protection used in connection with different combinations of cable and equipment, the committee offers a preliminary draft of specifications for electrical protection of telegraph and telephone plant for the consideration of the meeting.

Committee No. 5, Telegraph and Telephone Development, will present the usual report relative to the special advances and developments in the art of telegraphy and telephony that have been called to its attention.

Committee No. 6, Message Traffic, will present a brief report on the following subjects:

Censoring, mailgrams, filing time on messages, and standard telegraph blanks, and possibly one or two other items on similar subjects.

Committee No. 7, Editing. The Editing Committee which consists of E. C. Keenan, chairman, L. S. Wells and Stanley Rhoads, will make a brief report of its recommendations in connection with standard forms to be followed in printing the proceedings, specifications and drawings of the Division.

The following miscellaneous or special matters will be brought up at the Chicago meeting:

A draft of the latest regulations of the Telegraph and Telephone Division, will be presented to the meeting for its consideration.

The chairman will make an address covering briefly the events that have transpired during the past six months, the work to be undertaken by the Division and some recommendations and predictions for the future.

There will be an election of officers and members of the Committee of Direction.

At the meeting of the Committee of Direction, held in New York on May 15, all of the associate members of the former Association of Railway Telegraph Superintendents were appointed affiliated members of the Telegraph and Telephone Division.

M. H. Clapp, manager of the Telegraph and Telephone Section of the Railroad Administration, and President of the Association, states that all of the important reports of the committees are being printed and will be mailed to the members in time for all to come to the meeting prepared to discuss the provisions and recommendations contained therein. A record attendance is anticipated and it is desired that the thoroughness of the discussions shall be a criterion of the interest and activity of the members in the work in hand.

### ENTERTAINMENT.

On the evening of June 10, there will be a get-to-gether meeting, affording all members and others present an opportunity to renew social acquaintance, and on the evening of June 12, there will be a banquet, all arrangements for which are being attended to by the Railway Telegraph and Telephone Appliance Association.

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## THE TELEPHONE.

FRANK F. FOWLE and JAMES H. CRAVATH have formed an engineering partnership under the firm name of Fowle and Cravath, with offices in the Monadnock Block, Chicago, Ill. Mr. Fowle has had long experience in the telephone engineering and executive fields, and Mr. Cravath is a well known consulting electrical and illuminating engineer.

ERNEST C. CARR of the engineering department, American Telephone and Telegraph Company, Chicago, is in New York, devoting a few weeks to the study of telephone engineering developments.

W. R. PATTEN of the Plant Department, American Telephone and Telegraph Company, San Francisco, is in New York for a few weeks on special duty.

THE STROMBERG-CARLSON TELEPHONE MFG. CO., Rochester, N. Y., has been awarded a contract to furnish complete telephone exchange equipment for one of the main offices of the Shanghai Mutual Telephone Co., Ltd., Shanghai, China.

### The North Electric Company.

The North Electric Company of Galion, Ohio, has been reorganized as the North Electric Manufacturing Company. The new vice-president is Frank R. McBerty, and the new general manager, Kempster B. Miller; Charles H. North remaining as president of the company. The principal product of the company will be machine switching telephone apparatus.

### The Dallas Telephone Company.

The Dallas Telephone Company is the name of the new company which takes over the combined plants of the Dallas Automatic Telephone Company and the Southwestern Telephone and Telegraph Company, Dallas, Tex. The officers of the new company are: H. J. Pettingill, president; A. B. Elias, J. E. Farnsworth, and J. C. Casler, vice-presidents; E. D. Nims, treasurer; J. P. Crowley, secretary; R. A. Nickerson, assistant treasurer; W. R. Faught, assistant secretary; and James K. Wass, general auditor. The executive committee is composed of Edgar L. Flippen, Edwin F. Carter, and H. J. Pettingill.

### Spence Electric Company.

J. L. Spence who, for the past six years, has acted as general manager and chief engineer of the Stentor Electric Manufacturing Company, has severed his connection with the Klaxon-Stentor Company which, in May of last year, took over the manufacture and sale of Stentor equipment. He will now be identified only with the Spence Electric Company, this company having been organized to handle such equipment as Mr. Spence's extensive experience in the electrical field qualifies him to handle and develop.

### Western Electric Company—Organization Changes.

The following changes in the organization of the Western Electric Company will take effect as of June 1:

J. M. Skinkle, formerly connected with the engineering department, has been appointed assistant manager of the government department, with headquarters at New York.

J. A. Pizzini, for a number of years sales manager at the New York office, has been appointed assistant manager at the same place.

W. J. Drury, until recently manager of the Western Electric Company's Cleveland house, has been appointed sales manager at New York.

A. M. Collins, formerly sales manager at the Western Electric Company's Detroit office, succeeds Mr. Drury as manager of the Cleveland house.

A. R. Maynard, until recently connected with the sales department in Chicago, has been appointed sales manager at Detroit.

Walter Treat Walker has been appointed manager of the company's Buffalo, N. Y., house.

Gregory Brown has been appointed manager of the Newark, N. J., house of the company.


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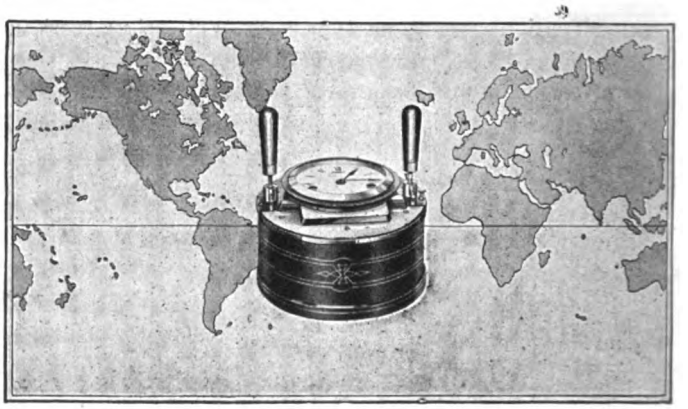

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# QUESTIONS AND ANSWERS

### The Radian.

T. L. M.—A radian is an arc of a length equal to the radius $r$. There are

$$\frac{2\pi r}{r} = 2\pi = 6.283 \text{ radians to a circumference, or}$$

$$\text{a radian} = \frac{360°}{6.283} = 57.3°, \text{ nearly.}$$

### Mechanics' Measurements.

G. M. D.—To find the number of square yards in a floor or wall, multiply the length in feet by the width or height in feet, and divide the product by nine.

*Board Measure*—If the board is one inch or less in thickness, the number of feet of lumber is found by dividing the length in feet times the width in inches by twelve. If the board is more than one inch thick, the number of feet, lumber measurement, is found by dividing the length times the width times the thickness by twelve.

These questions are not electrical, but the answers are published because telegraph and telephone engineers frequently find it neecssary to make these space measurements, and it is well to have the data in pocket note books.

### Ohmic Equivalent of Back E. M. F.

F. K. J.—The ohmic equivalent of back electromotive force $E$; that is, resistance $R$ which is added to the circuit when the motor is prevented from turning its armature, causing the current $I$, flowing in the circuit, to remain unaltered, is

$$R = \frac{E}{I}$$

### Radio Aerial.

A. L. D.—A three wire aerial fifty feet in height and fifty-seven feet long has a natural wave length of 195 meters. Its capacity is approximately .00025 microfarad.

### Fast Morse Operators.

E. G. C.—In the Western Union service, fast Morse working recently announced, includes the work of Raymond Wright, of Norfolk, Va., who according to the records has sent sixty-four messages in thirty minutes; received 131 messages in one hour, and handled 845 messages in nine hours. Arthur E. Harrow, of Seattle, Wash., has handled 106 messages in one hour, and eighty-seven messages per hour over a period of eight hours. Walter Flynn, of Cincinnati, Ohio, handled 102 messages per hour over a period of eight hours.

### Radio Loading Coils.

J. J. M.—With receiving circuits, including regenerative audion and multi-step amplifiers, it is practicable to load 300-meter aerials so that they will have an operative wave-length of 12,000 to 15,000 meters. A suitable loading coil may be made up as follows: Tube, 26 inches long and 5½ inches in diameter, wound with No. 24 single silk-covered wire; the secondary consisting of a similar tube, wound with No. 30 single silk-covered wire.

An inductively coupled receiving tuner, having a range from 300 to 3,000 meters, should have a primary winding six inches long and four inches in diameter, wound with No. 24 single silk-covered wire. The secondary, 6 inches long and 3½ inches in diameter, should be wound with about six hundred and fifty turns of No. 32 single silk-covered wire.

### Cost of Meters.

T. L. G.—Voltmeters and ammeters of reliable manufacture cost from $5.00 to $50.00 each. If you will advise us the purpose for which the instrument is to be used, the degree of accuracy required and about what price you wish to pay we can give you more definite information.

### M. K. and T. Railway Company

F. L. M.—W. H. Hall, is superintendent of telegraph of the Missouri, Kansas and Texas Railroad, with headquarters at Denison, Tex.

### The Edison Polar Relay.

T. P. M.—The invention of the Edison polar relay was covered in patents taken out by Mr. Edison in 1873 and 1874, for duplex and quadruplex systems of telegraph. His first duplex patent was No. 147,917, issued April 23, 1873. Patent 150,846 of April 23, 1873, referred to the relay. The seven patents issued to Mr. Edison in August, 1874, covered the duplex and quadruplex as finally completed. The patent numbers were: 178,221, 178,222, 178,223, 180,858, 207,723, 207,724 and 480,567.

### Civil War Telegraphs.

F. L. M.—During the war, there were constructed about 15,000 miles of military telegraph lines. The cost of the military telegraphs from May 1, 1861 to Dec. 1, 1862, was about $22,000 per month; during 1863, it averaged $38,500 per month, and in 1864, $93,500 per month. For the year ending June 30, 1865, the total cost was $1,360,000.

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# Electro-Physics for the Telegraph, Telephone and Radio Student

No. 6

### LOW FREQUENCY.

For the purpose of establishing relations between what are termed high-frequency, and what are termed low-frequency electric currents, it may be of value here to state that for electric lighting and electric power work at various times the following frequencies have been in use in this country, namely, 133 1-3, 125, 83 1-3, 66 2-3, 60, 50, 40, 30, and 25 cycles per second.

In the earliest alternating current work the whole service consisted of incandescent lighting, and the electric equipment was made up of small high-speed belted single-phase generators and house-to-house distributing transformers. Up to the year 1890, 125 and 133 1-3 cycles were the usual frequencies, but later developments employing engine type generators suggested the employment of 7200 alternations per minute (60 cycles per second), this frequency being a compromise of all the various intermediate and lower frequencies; and, so, at the present time sixty-cycle current is the standard frequency for commercial lighting and power alternating current work.

### PRODUCTION OF HIGH FREQUENCY CURRENTS.

There is a wide gap between the low frequencies used in commercial lighting and power circuits and the frequencies used in telephony, high frequency telegraphy and radio telegraphy and telephony, and as it is the purpose of this series of articles to acquaint students with the theories and principles underlying the new developments in electric communication, the following lessons will deal with high frequency phenomena.

The methods of producing high frequency alternating currents may be divided broadly into four classes; alternator (machine) methods; methods based on the oscillatory discharge of a condenser, electron tube, and arc methods. By means of machine generators of electricity it is possible to generate currents of 200,000 frequency. By the condenser method, employing adjustable capacity and inductance it is possible to produce frequencies of any figure between 1 and 100,000,000. In explaining the arc method of producing high frequency currents it may be stated that if an ordinary direct-current arc is produced between solid carbon or metal electrodes, it is unstable; that is, it cannot burn unless a resistance is placed in series with it. The current can be maintained at any desired value by putting sufficient resistance in series with the arc, so that when the current is increased the potential difference between the terminals of the arc and the resistance taken together increases, and the circuit as a whole becomes stable. If such an arc be shunted with an inductance unit in series, oscillations will be set up in this shunt circuit, the frequency of the oscillations being mainly determined by the periodic time of the shunt condenser circuit. When the oscillations are taking place the oscillatory current flows through the arc, and consequently tends to increase and decrease the arc current. Any increase in the current tends to make the vapor column of the arc larger, and any decrease makes it smaller, so that the vapor column of the arc pulsates in size. This pulsation in the size of the vapor column moves the air in the neighborhood of the arc, and if the frequency is suitable, produces sound; hence this phenomena is termed the speaking, or musical arc. By varying either the capacitance or the inductance, the frequency of the oscillations produced may be varied.

### THE POULSEN ARC METHOD.

The frequency of the oscillations produced by an ordinary arc between solid electrodes is comparatively low, at the most a few thousands per second. Among the various methods of increasing the oscillations per second produced by an arc, that of Poulsen has been perhaps the most successful. This method consists in placing the arc in a hydrogen, or some hydrogen compound such as coal gas or alcohol vapor. By this means high frequency oscillations can easily be produced up to about one million per second. When the apparatus is properly adjusted the oscillations produced are very nearly true alternating currents.


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## SHOP TALK.

### Electric Clocks.

BY THE OBSERVER.

Many attendants whose duty it is to take care of the clocks handle them on the work-bench with skill equal to that displayed by mechanics in the factory; but after that is done too often their further efforts to provide accurate registry of time do not have the best results.

To maintain correct time internal supervision is necessary. First make sure that you unfailingly get the Washington, or Mare Island, signal daily; and getting it see that your master clock is accurately corrected. Some attendants think that setting the master clock a certain number of seconds every twenty-four hours is as nearly perfect as a clock will run. This is an incorrect premise, for we have seen sub-master and master clocks that would run for many days and not require any addition or subtraction of magnetic influence, nor adjustment of the pendulum. This condition may be obtained in any case with proper handling, and certain it is that the instructions issued are plain and easy to understand.

Another trouble is that some attendants knowing that a clock is not keeping accurate time will let it alone because perhaps it may be in an unhandy position. This brings up another point for consideration. First, let us say that regardless of location the clock should always receive due attention. In general the telegraph time service is the best in the world, therefore one outstanding inaccurate timekeeper stands as a reflection upon the entire service. No amount of time or labor spent would seem too great to effect a remedy.

Now, in regard to the unhandy position of clocks. Whenever an installer is requested by a subscriber to place a clock in a location which experience tells you will make it difficult of access in case of trouble, the matter should be explained to the subscriber in its proper light. In most cases you can suggest a location on his premises which will meet his requirements and at the same time place the clock in an accessible position.

Another bad habit, when making your rounds, is to pass clocks by that are not registering accurately, comforting yourself with the thought, "I'll fix that later." There may be occasions when it is not practicable to correct all irregularities as soon as they occur, or are observed, but in your memorandum book an entry should be made so that the matter may be followed up at the first possible opportunity.

The work of the clock attendant is not burdensome, and if he has a proper realization of the importance of accurate time, a service for which he is responsible, occasions will arise frequently when he will learn from the company and from the subscriber that his efforts are appreciated.

### Electrical Instrument Making for Amateurs.

The above is the title of a book by S. R. Bottone, now in its eighth edition, which was written for the amateur experimenter who desires to learn electrical engineering principles by making electrical devices with his own hands. There are 272 pages and ninety-six illustrations, and detailed descriptions are given of how to make condensers, Leyden jars, induction coils, electroscopes, Tesla coils, magneto armatures, thermopiles, elementary wireless telegraph apparatus and many other pieces of electrical apparatus. The instructions are so simple that only inexpensive tools are required in making the instruments described.

The book sells for $1.35, and copies may be purchased from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

### Digging Pole and Post Holes.

It is not much trouble to dig a post hole in warm weather if it is to be put down in fairly soft ground, but in hard soil or in winter, when the soil is frozen, a different story is told. That is real work; at least it is for the chap that does not know how to use dynamite for the purpose.

Of course, a bore hole must be put down into which the explosive may be loaded. That is not always easy unless one has the proper tools. In average hard clay, a long churn drill with a little water does the trick. For harder ground, a heavy steel drive point and sledge are better. A soil auger is useful for finishing the bottoms of deep holes when churn drilling or punching is difficult. Hard shale and rock require the use of rock drills.

The charge of dynamite should be prepared as shown in the illustration.

A straight narrow lath, reed, or stick is used which must be as long as hole is deep. The dynamite cartridges are cut into two or three pieces, and at regular intervals tied to the stick. The blasting cap with length of fuse attached is inserted in the uppermost piece of dynamite. The pieces of dynamite are spaced six to twenty inches apart, depending on the nature of the soil. Two or three test shots will indicate the proper spacing. Aim to use as little dynamite as possible to get the result desired.

The stick with dynamite tied to it is run down the hole, the fuse lighted, and the explosive does the rest.

Ordinarily, no tamping is desirable, as a narrow hole is wanted, and tamping would result in a broader opening, roughly triangular in shape, broadest at the top and narrowest at the bottom.

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## REUNION OF OLD-TIME TELEGRAPHERS' AND HISTORICAL ASSOCIATION AND THE SOCIETY OF THE UNITED STATES MILITARY TELEGRAPH CORPS.

The annual reunion of the Old-Time Telegraphers' and Historical Association and the Society of the United States Military Telegraph Corps will take place at Cleveland, Ohio, on September 10, 11, and 12. As this is the first reunion of the old-timers since the New York gathering in 1916, a large attendance is expected. The Hotel Winton has been selected as headquarters.

The officers of the association are: President, W. H. Canniff; vice-presidents, T. W. Hill, B. J. Ross, and F. W. Sprong, Cleveland; secretary-treasurer, John B. Taltavall, 253 Broadway, New York. Executive Committee—Andrew Carnegie, New York; George M. Myers, Kansas City, Mo.; H. J. Kinnucan, Detroit, Mich.; Wm. S. Jordan, Jacksonville, Fla.; and W. D. B. Alexander, S. C. D. Johns, H. P. McIntosh, D. C. Moon, and W. R. Woodford, Cleveland, Ohio. General Committee—W. R. Woodford, Chairman; B. J. Ross, H. P. McIntosh, W. D. B. Alexander, T. W. Hill, D. C. Moon and W. H. Canniff. Hotel Committee—W. R. Woodford, Rockefeller Building; and B. J. Ross, Western Union Telegraph Company. Finance Committee—T. W. Hill, chairman, The Guardian Savings and Trust Company; and S. C. D. Johns, treasurer, the Cleveland Electric Illuminating Company. Entertainment and Banquet Committee—W. R. Woodford, chairman, Rockefeller Building. Registration Committee — I. Morris, chairman, 732 *Leader-News* Building, Cleveland, Ohio. Press and Printing Committee—B. J. Ross, chairman. Reception Committee—W. H. Canniff. Ladies' Reception Committee—Mrs. W. H. Canniff. Committee on Badges—H. E. Patton, chairman.

The officers of the Society of the United States Military Telegraph Corps are: Vice-presidents—Richard O'Brien, Scranton, Pa.; Arthur Lincoln Tinker, Stamford, Conn.; William L. Ives, New York. Secretary-treasurer—David Homer Bates, 658 Broadway, New York. Executive Committee—Col. Robert C. Clowry, Col. Albert B. Chandler, and Henry Waycott Dealy, New York; Albert W. Orton, Jr., Rome, N. Y.; John Wintrup, Philadelphia; Charles Patterson Bruch, New York; Francis S. Wilson, Jersey City, N. J. Historian—William R. Plum, Lombard, Ill.

Owing to the death of Col. William Bender Wilson, president of the society, the office of president will not be filled until the Cleveland convention.

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"Syzygy" may look like one of those words which appear so frequently in state department cablegrams, but the fact is it is not a code word at all. You may find it in the dictionary, and it means, "the point at which the moon is in conjunction with, or in opposition to, the sun."

## THE O. O. COLUMN.

*(This month's column contributed by the Onlooker.)*

The young repeater-man remarked to the old chief that, in his opinion, the mux machinery is being treated pretty rough: that often he hears them request the man at the other end to "kick" it.

Because a lineman is found hunting for trouble, is that any reason why he should be arrested?

### In the Big Main Office.

QZ. "Write."
ZQ. "Love, thou art——"
QZ. "That's in the mud."
ZQ. "Now is the time ——"
QZ. "That's too gummy."
ZQ. "How's this? A maiden once ——"
QZ. "It's no good."
ZQ. "It is good. Wait till I tell it to you ——"
QZ. "Write."
ZQ. "What else can I do?"
QZ. "Clean your p. c."

---

### "The Wire Devils."

The above is the title of a new book written by Frank L. Packard, author of several well known popular novels. In "The Wire Devils" Mr. Packard has produced a book based upon the surreptitious use of a railroad company's telegraph wires for criminal purposes. The "gang," composed of ex-telegraphers and ex-linemen, stage many exciting events which keep the railroad company's detective force on the jump day and night for a long period.

The deviltry of the stunts arranged by the ex-operators is palliated somewhat by a romantic and chivalrous streak in the makeup of "The Hawk," who is the chief plotter. The book contains more sudden twists of fortune and exciting moments than any telegraph novel ever before written.

The price is $1.50 per copy, and it may be obtained from Telegraph and Telephone Age, 253 Broadway, New York.

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### Electrical Measurements and Meter Testing.

This is a plainly written book, by D. P. Moreton. The book is particularly valuable to the telegraph and telephone engineers, because it deals directly with the subjects with which they are particularly interested. The voltmeter and the ammeter are the instruments used in this line of work, and these are to be found in all modern offices. Price, $1.00 per copy. For sale by Telegraph and Telephone Age, J. B. Taltavall, publisher, 253 Broadway, New York.

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The Order of Railroad Telegraphers, Grand Division, opened its twenty-second regular session, at St. Louis, Mo., May 12. About 700 delegates are in attendance.

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## DEMOCRATIZING TELEGRAPHS AND TELEPHONES IN FOREIGN COUNTRIES.

In European countries, where the systems of electric communication are owned by the governments, Belguim is the first to plan and set in motion agencies which it is hoped, will do much to popularize the telegraph and telephone service, and to eliminate the restrictions incident to bureaucracy.

A special department for the press and publicity has just been created by Royal decree in the Belgian Ministry of Railways, Marine, Post, Telegraph, and Telephone. The first director of this department has been appointed. This is the result of the report of the Minister of Railways to the King, which was as follows:

The advantage derived from publicity in commercial enterprises needs no longer any proof, and in order to be convinced of this it is only necessary to look around and see what is being done in other countries by public organizations and by private firms.

The Ministry of Railways, Marine, Post, Telegraph, and Telephone would increase by this means the income of its different departments.

Also the public would be informed regularly and systematically of all the regulations, changes, and reforms introduced from time to time to improve the different services in the interests of the population and to present, by means of an intelligent propaganda and publicity, the advantages derived from the changes.

On the other hand the department possesses a wonderful means of publicity in its official publications, such as its railway time-tables, telephone directories, also in its thousands of waiting rooms, platforms, post offices, railway cars, steamers, where the public can find an excellent opportunity to advertise.

Here is a source of considerable revenue which can be derived for the Government if this means of advertising is made use of in centralizing all the services which have to do with this and suppressing the system of exploiting these opportunities through private sources.

Last of all in the interest of a good operation of the administration it is most desirable to give continually in the public press all the criticism made concerning the organization and operation of the different public services of the Ministry of Railways, Marine, Post, Telegraph, and Telephone, and these criticisms should be examined thoroughly without delay to see whether they are well founded, and, if so, remedies should be adopted at once, as far as possible.

For the above reasons I have the honor to propose to your Majesty the creating of a department for the press and publicity, whose action will extend to all the departments and administrations, of the Ministry of Railways, Marine, Post, Telegraph, and Telephone, and which will systematically put to profit all the advantages to be derived from the press and publicity.

The Belgian Government owns all the telephone and telegraph lines, and it may be of importance to American manufacturers to know of this new department of publicity, as they would be able to advertise very effectively through this organization. The address of the director is Mr. C. Joset, Directeur du Service de Presse et Publicite, Ministere des Chemins de Fer, Marine, Postes et Telegraphes, Brussels, Belguim.

### Cable Codes.

TELEGRAPH AND TELEPHONE AGE is headquarters for all cable cipher codes. Telegraph managers would do well to bear this fact in mind when customers make inquiries regarding such codes. We are prepared to furnish full information on the subject, our knowledge being based on over thirty-five years' experience in handling the hundreds of codes on the market. Address TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

TELEPHONE CONSTRUCTION, INSTALLATION, WIRING, OPERATION AND MAINTENANCE. By W. H. Radcliffe and H. C. Cushing, Jr. A guide for the installation of telephone exchanges in buildings and small towns. An extremely practical book. One hundred and sixty-five pages and 120 illustrations. Price, $1.00.

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## RELATIONS BETWEEN COMPANY OFFICIALS AND EMPLOYEES, ORGANIZED AND UNORGANIZED.

*By John McMillan, Manager, Canadian Pacific Railway Company's Telegraphs.*

[The following paper was read by Mr. McMillan at a conference held recently in Montreal, of the officers and employees of the Canadian Pacific Railway Company, including officers and employees of the telegraph organization.]:

The relations between the company's officers and employees must be marked by cordial goodwill, intelligent co-operation and mutual respect. We cannot hope to build and maintain a successful organization on any other foundation. Officers should bear in mind that they are almost wholly responsible for the relations that exist between the official staff and employees. Officers instruct and direct. An officer should remember to instruct as he himself would like to receive instruction. All instruction should be clear and concise. Officers who expect to maintain the best relations with employees, should refrain from irreverent appeals to the Supreme Being; profane or abusive language is a weakness and should be avoided. Officers should be quick to note exceptionally good service. Your appreciation should be expressed. You should encourage the less skilful or less efficient; it will pay big returns. Helpful encouragement will make better workmen. Do not threaten to dismiss any employee, unless as a last resort.

### ORGANIZED EMPLOYEES.

The best relations will be maintained when officers and employees thoroughly understand and live up to the conditions of service contained in the schedule agreed to by the company and employees. Trifling schedule evasions may mean hours of argument before a labor board. Schedule evasions mean little to the company, and often lead to serious dispute. Officers should deal with organized employees with such fairness that there will be no occasion for an appeal to a grievance committee.

### UNORGANIZED EMPLOYEES.

The relations between officers and unorganized employees should be marked by careful supervision. Officers should have a personal knowledge of each employee's record, so that good work will result in promotion. If there is no opportunity for promotion, and the work of the unorganized employee is important, an increase in salary should be arranged, without waiting for an appeal from the employee. The supervision of the unorganized employees is the best test of an officer's fitness to maintain good relations with his staff. There may be little pressure other than his own standard of what is right and fair. His supervision should be such that the unorganized will feel no disadvantage by reason of the lack of organization.

Officers who discipline or dismiss, should, with as little delay as possible, give the employee the full reason for discipline or dismissal and not keep him in suspense. It is a waste of time, for which there is little or no excuse.

So far we have considered the principles that mean success in every organization, namely, goodwill, co-operation, and respect; the general principles of supervision, the recognition of faithful service as applied to organized and unorganized employees. If, however, we wish to create and develop broader lines of organization, which will mean better relations between officers and employees, then we must not be unmindful of the interests beyond the lines of instruction and obedience.

### SAFETY FIRST.

We should consider the principles of safety first. Safety first methods are designed first to protect the employee. Safety first has been advertised extensively, wherever it seemed possible to find space for the familiar motto—"Safety First." Have safety first measures prevented accidents? Has safety first resulted in greater safety in transportation, less risk of injury to employees and passengers, and less loss of life? Officers should freely express their views as to the safety first rule. We should hold fast to every factor of safety and protection against accident.

### FIRST AID.

First aid measures should appeal strongly to officers and employees. First aid training, carried out by the company without expense to the employee, is appreciated by the employee, as it is an evidence of generous preparation to protect him in the event of accident or unexpected breakdown due to ill health. In the event of accident our sympathies are quickly aroused, yet, without a proper knowledge of first aid, we can be of little assistance. First aid training will mean prompt and intelligent care of the injured, relieve suffering, and probably save human life. First aid training should be taken up by officers, foremen, chief clerks, engineers and conductors, and an effort made to enroll all who are interested.

### WELFARE WORK.

We should not forget the general need for a broad policy of helpfulness in welfare work. The officers should consider, and probably suggest that the company appoint for the system, a general welfare work officer, appointed to make an inspection of all divisional points where the employees are housed in the company's buildings, and all Y. M. C. A. centers, social and athletic activities and supervision of general recreation interests.

### BENEVOLENT FUND.

An opinion should be expressed as to the need of creating a benevolent fund, maintained by the officers and employees by subscribing part of one day's pay; this fund to be administered by a committee of the employees on each grand district, to apply to all cases of unusual need caused by ill health or other emergency cases, not now provided for. For example, where an employee is advised by his physician that unless he is in a position to take special treatment, or two or three months' rest and

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treatment in a sanatorium, he is likely to suffer a complete collapse. In a case of this kind a request should be made for money to be taken from the benevolent fund. If the fund created by employees is well handled for at least one year, officers might then recommend that the company consider some assistance to it.

The country and company have passed through a critical period during the last four years. The company's record has been one of high honor; its policy has been marked by a generous administration; its officers are well trained and its employees efficient. It is, I am sure, the ambition of officers and employees, alike, to uphold the present high standard and bend every energy to effect improvements. We will attain the best results by broad and considerate administration and by mutual respect between officers and employees, and through a thorough understanding by the employees of the company's policy of generous and fair treatment.

# New Alternating Current Relay

The accompanying illustration shows a recently patented alternating current signal relay which, in appearance, is the same as ordinary direct current district service or main line telegraph relays. The adjustments are the same as with ordinary relays; that is, by movement of the electro-magnets relatively to the armature and by means of a retractile spring attached to the armature. The armature, tongue, and trunnions are the same as in direct current relays of the usual types.

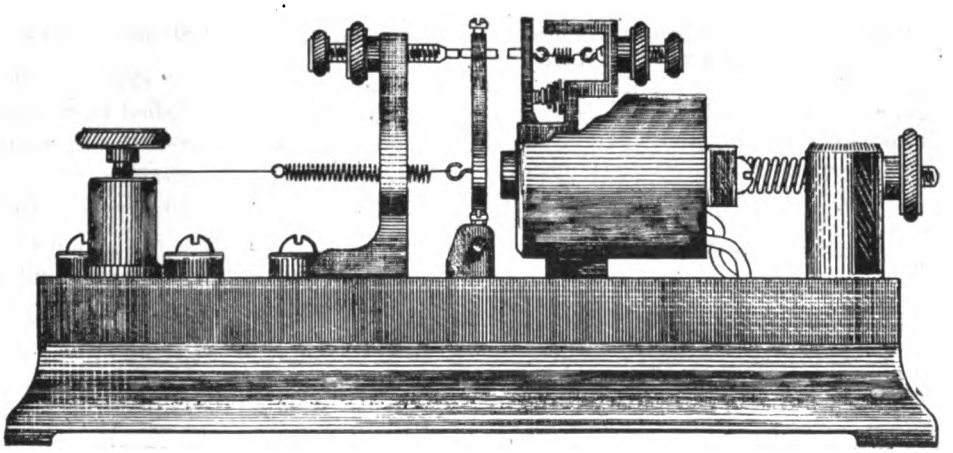
This relay will operate satisfactorily on any current strength from ten to 200 milliamperes, and the current may be from a direct current source, or from an alternating current source of any commercial frequency and voltage.

The view of the construction of the relay shown herewith illustrates a cushion contact in place of the solid contact used in ordinary direct current relays. The cushion contact is so designed that it is substantial and introduces no trouble making complications.

When used with alternating current the relay armature remains in contact with the relay front stop so long as current flows through the relay coils. By virtue of the floating contact the armature cannot break contact, as the current changes from positive to negative at the zero point; the relay is noiseless, and a sounder, register, or bell operated locally by it, is actuated the same as when direct current is used; there is no fluttering of the sounder or register armature.

The main advantage in using this relay is that to operate district service, fire alarm, or other signal circuits, there is no necessity for the setting up of motor generators, primary batteries or storage batteries. Simple connection with the public service 110-volt, 60-cycle mains is all that is required. Where the public service system is ungrounded a small transformer may be used and one terminal of the secondary grounded, where it is desired to operate the relays in single wire, ground return circuits.

This relay is now in use in New York on a large number of district service circuits, and during the war was used in France in main line Morse telegraph service operated by alternating currents.



UNIVERSAL RELAY

For Alternating or Direct Current Operation.

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## OBITUARY.

S. W. KNAPP, aged 76 years, an old-time telegrapher and a member of the United States Military Telegraph Corps during the Civil War, died of pneumonia at Detroit, Mich., on April 21.

JAMES H. BABCOCK, aged 66 years, identified with newspaper telegraph service in Pittsburg for twenty-eight years, died in that city on May 9. He was a native of Newark, N. J., where he learned telegraphy.

H. O. NIGHTINGALE, aged 75 years, who was identified with the Free Message Bureau as chief of railroad accounts of the Western Union Telegraph Company, when the headquarters were at Rochester, N. Y., and who was transferred to New York when the headquarters were removed to this city in 1866, died at the home of his son in Detroit, Mich., on May 12. Mr. Nightingale was well known to the telegraph officials in his day. He engaged in other business in the West many years ago.

GEORGE FRASER, Monrovia, Cal., a member of the United States Military Corps, died March 7.

### Telegraph and Telephone Life Insurance Association.

Assessment number 657 has been levied by the Telegraph and Telephone Life Insurance Association, to meet the claims arising from the deaths of S. T. Dunham at Topeka, Kan., Nathaniel Hucker, at Buffalo, H. K. Atkinson at Pittsburg, J. L. Pringle at Chicago, E. E. Moore at Washington, D. C., and Thos. P. Grady at St. Louis, Mo.

### Book for Telegraphers.

"Twentieth Century Manual of Railway, Commercial and Wireless Telegraphy," by F. L. Meyer, is the title of a practical book for railroad telegraph men and dispatchers. Every branch of the railroad service has been covered in a practical and masterly manner, and the information given is the result of wide observation and experience. This book is a complete education in railroad telegraphy, from first principles to the finished operator, who can be relied upon to do things in emergencies. It has a chapter on wireless telegraphy. Price $1.25. For sale by TELEGRAPH AND TELEPHONE AGE, J. B. Taltavall, Publisher, 253 Broadway, New York.

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### New Book on Radio Telegraphy.

"Principles of Radio Telegraphy," is the name of a new book by C. M. Jansky, which covers the latest practice in radio engineering. The book contains 237 pages and has 179 illustrations.

The first four chapters deal with elementary electrical engineering as applied to radio work, and the remaining seven chapters go thoroughly into the subjects of electromagnetic waves, alternating currents, oscillatory circuits, radio circuits, practical transmitting appliances and methods, practical receiving appliances and methods, and vacuum tubes and their use in wireless telegraphy.

We recommend this fine work to all who are studying or who intend taking up the study of radio signaling.

The price of the book is $2.00 and copies may be purchased from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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# Telegraph and Telephone Age

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NEW YORK, JUNE 16, 1919.

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### Foreign Opportunities.

North Americans traveling in South America have been at a loss to account for the fact that although our southern neighbors have shown a preference for the top hats, fold collars and other articles of personal raiment manufactured in the United States, to the south the machinery of commerce bears old-world earmarks.

The electrical apparatus with which South American telegraph lines are operated in the past has been procured from European countries, largely from Germany. On the whole the service rendered has been comparatively satisfactory, but the volume of the wire traffic has never reached large figures.

The office instruments, terminal equipment, and systems used are not modern to a degree comparable to that comprising practice here. The Baudot system is in favor for the heavier trunk circuits, and it would seem that simple and flexible printing telegraph systems, such as the Morkrum, should find an application in those countries that would give telegraph communication a new opportuity. Telephone apparatus of United States manufacture has gained a favorable foothold in Central and South American countries, and it is likely that there will be an increasing amount of our telephone equipment find its way into service there.

But, in the telegraph field we have not done much to show South American administrations that we can be of service to them in supplying improved and efficient systems and apparatus. The time has about arrived for a telegraph and telephone convention and exposition, to include radio.

So far as European countries are concerned it has been with some amazement that American manufacturers have realized that there is to be a market there for our telegraph supplies. The questions of payment and credit very likely presented as difficulties, but as conditions and requirements become clearer, it develops that we are in reality almost certain to serve that field permanently.

Although it was not in the articles of war, the performances of our Signal Corps men using American telegraph systems and apparatus proved a revelation to the authorities abroad, so much so that there is on all hands a tendency to adopt American methods.

Our Signal Corps men operating in various European countries found in use there telegraph systems long out of date and not adequate to modern commercial requirements.

Among the large manufactures and distributors of electrical products, the Western Electric Company and the General Electric Company have formed international selling organizations which undoubtedly will procure for these interests their share of the business. The large number of smaller companies manufacturing specialties and patented articles controlled by them should in a cooperative and organized way take up immediately and in earnest the work of serving these new fields. TELEGRAPH AND TELEPHONE AGE has within the past two months acted to connect several foreign purchasers with American manufacturers of telegraph and telephone apparatus, and believes that the possibilities of trade are substantial and encouraging.

There is the opportunity! What are we going to do about it in an organized way?

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# CURRENT EVENTS

## EXECUTIVE OFFICE ANNOUNCEMENTS, PERSONAL MENTION, APPOINTMENTS

### PERSONAL.

W. J. LLOYD, formerly general manager of the Western Union Telegraph Company, Denver, Colo., who retired from active service three years ago, since which time he has been living at Mobile, Ala., has returned to Denver owing to the failing health of Mrs. Lloyd. Mr. Lloyd will probably make Denver his permanent home.

W. E. HARKNESS, late Major, O. R. C., and previously electrical engineer with the Western Electric Company and Hall Switch and Signal Company, has joined the engineering staff of the American Manganese Steel Company, Chicago, and will be in charge of the work of standardizing production methods at the company's various plants throughout the west.

W. E. PEIRCE of the Washington, D. C., office of the Western Union Telegraph Company and well known in all sections of the country has taken a leave of absence of three months which he will spend on a ranch near Peck, Idaho.

WILLIAM NOBLE, has been appointed engineer in chief of telegraphs, at the General Post Office, London, succeeding Sir William Slingo. Mr. Noble entered the telegraph service as operator in the year 1877, at Aberdeen, Scotland, and has advanced through all grades of the telegraph and telephone engineering service.

1ST CL. SERGEANT R. J. STEPHENSON of the 107th Field Signal Battalion, 32nd Division, has returned from France and Germany, and has re-entered the telegraph service at his old home, Detroit, Mich.

O. M. SCREWS of the San Antonio, Tex., Western Union Telegraph Company's office, accompanied by his wife, is absent on a month's vacation which will be spent fishing in the vicinity of Port Arthur, Tex., and in the mountains adjacent to Dalton, Ga.

MISS GRACE D. BANKER of Passaic, N. J., chief telephone operator of the army telephone service at Coblenz, Germany, on May 22 received the Distinguished Service Medal. The medal was presented to Miss Banker by Lieutenant General Liggett, at army headquarters.

### POSTAL TELEGRAPH-CABLE COMPANY.

EDWARD REYNOLDS represented the company in the hearing recently before the House Interstate Commerce Committee, Washington.

C. E. BAGLEY, superintendent, Philadelphia; E. Kimmey, superintendent, Boston; C. A. Richardson, superintendent, Albany; and H. Scrivens, superintendent, Pittsburg, were in New York for a conference, May 26–27.

C. E. DIEHL, manager, Harrisburg, Pa., was a New York business visitor, May 27.

R. H. CORNWELL, has been appointed cashier of the San Francisco office, vice E. K Backus, resigned.

R. MARTIN has been appointed night chief operator at Butte, Mont., vice R. Miller, resigned.

MANAGERS APPOINTED: M. E. Strout, Concord. N. H.; S. W. Baker, Evanston, Ill.; I. Neel, Pittsburg, Kan; Mrs. O. G. Ashford, Lawrence, Kan.; G. W. Reiners, Galesburg, Ill.; B. S. Tirrell, Pomona, Cal.; C. W. Ray, Barstow, Cal.; W. A. Larey, Milledgeville, Ga.; A. S. Roberson, Petersburg, Va.; and R. L. Blaine, Charlottesville, Va.

### WESTERN UNION TELEGRAPH COMPANY.

NEWCOMB CARLTON, president, was in Washington several days recently, giving testimony before the House Interstate Commerce Committee relative to government control of the telegraphs.

JAMES P. EDWARDS, division traffic superintendent, Chicago, has been appointed assistant to W. N. Fashbaugh, vice-president in charge of traffic, with headquarters at New York.

J. J. WELCH, traffic engineer, New York, has been appointed division traffic superintendent of the Lake Division, with headquarters at Chicago, vice J. P. Edwards.

H. A. EMMONS, has been appointed traffic engineer, with headquarters at New York.

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J. F. RICHARDS, assistant superintendent of the cable station at Hearts Content, Newfoundland, is in New York, and will remain here during the next two months, familiarizing himself with late improvements in apparatus and traffic methods.

DANIEL CARTER, traffic chief, Boston main office, was a New York visitor on vacation, June 1. He was accompanied by his wife and daughter.

C. F. AMES, District Commercial Superintendent, Boston, Mass., announces the following changes in his district during the month of May:

Dana H. Russell, manager of Camp Devens, Mass., to Newport,, R. I.

Edward A. Goggin, chief operator, Camp Devens, to the managership there.

W. H. Boyers of Newport, R. I., transferred to Fitchburg, Mass.

J. L. Moyce, returned from government service, appointed manager, Northampton, Mass., vice Miss A. A. Newhall, returned to Newton, Mass., as manager.

James B. Shea, returned from government service, appointed manager, Norwood, Mass., vice Miss R. Robichau, furloughed.

C. H. Greenwood, returned from government service, appointed manager, Webster, Mass., vice J. J. Prout, transferred.

## New York Western Union.

ING. GILBERTO LASNIER, telegraph engineer for Uruguay, with headquarters at Montevideo, inspected the New York main office on May 20, and was greatly interested in the operation and handling of the telegraph traffic.

GENERAL MANAGER A. C. CRONKHITE of the Lake Division was a visitor at the No. 24 Walker Street office on May 23.

W. E. DULIN, an old time operator now in the government service, was a visitor at 24 Walker Street on May 29. He was accompanied by Mr. N. B. Topping, former night wire chief, retired. Mr. Dulin is 81 years of age and one of those who was associated with Professor Morse.

ON MAY 25, the Wire Club of New York inspected Blackwell's Island. Places of interest were pointed out by Dr. Bacon, head of the hospital, who personally conducted the members and their ladies around the Island.

## Telegraph Baseball Games.

The baseball season of the Western Union Messenger Boys' League, Metropolitan Division, is now in full swing and gathering interest on all sides as it progresses. Four games have been played so far, and from now on hotly contested games may be expected until the championship of the league is decided.

On Sunday, May 18, the second district team beat the third district by a score of 15–11. This game was full of excitement, being characterized by heavy hitting and good fielding. On the same day, the first district outplayed the fourth, winning by a score of 17–4. This game, too, was keenly contested—more so than the score would indicate.

The schedule was continued on May 25, with games between the first and second districts, and the third and fourth districts. The first game was won by the boys from district one; score 4–3. This was a pitcher's battle all the way, and the result was uncertain until the last man was out. Managers P. J. Sullivan and D. Drew of the first and second district teams, respectively, were enthusiastic over the professional calibre exhibited by their boys in this game. Fully 500 persons were present.

The third district played the fourth, at Prospect Park, on the same day, the score being 8–2 in favor of the former. The feature of this game was the splendid pitching and fielding of Sheridan, the one-armed pitcher from the Bronx.

The standing of the teams on May 31 was as follows:

| | *Played.* | *Won.* | *Lost.* | *P. C.* |
|---|---|---|---|---|
| Second District | 2 | 2 | 0 | 1.000 |
| First " | 2 | 1 | 1 | .500 |
| Third " | 2 | 1 | 1 | .500 |
| Fourth " | 2 | 0 | 2 | .000 |

The following games were played on Sunday, June 1:

First district vs. third district—Prospect Park—Diamond No. 11—4:00 p. m.

Second district vs. fourth district—Macomb's Dam Park—Diamond No. 2—4:00 p. m.

J. T. Carberry, district commercial agent, and M. Friedberg are giving the team managers valuable support in their efforts to make the baseball league a success.

## New Orleans Western Union.

J. G. HAYES, secretary of the Association of Western Union Employees, accompanied by Mrs. Hayes, paid a visit to New Orleans, May 11-14. During their stay a dinner and entertainment was given them which was largely attended by local officials and employees.

THE EMPLOYEES' ASSOCIATION held its second annual picnic at the Ridgeway Camp, West End, on Lake Ponchartrain, on May 25. The attendance was large, and included quite a number of officials and employees from other cities.

C. A. CUNEO, on May 26, was appointed wire chief, vice L. J. Farmer transferred to division headquarters, Dallas, Tex. F. J. Cord has been appointed repeater chief, vice Charles Nash, the latter being advanced to testboard attendant.

W. A. PORTEOUS, manager of the New Orleans office, is serving as foreman of the grand jury of the United States district court.

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## Lake Division Banquets J. P. Edwards.

That J. P. Edwards had been promoted from the Division Traffic Superintendency of the Lake Division, Chicago, to the post of Assistant to Vice-President Fashbaugh, New York, did not become known in Chicago until Tuesday, May 27, yet in spite of this late notice, his fellow workers arranged for him a highly successful banquet for the following night.

The banquet was held in the Empire Room of the Grand Pacific Hotel, and was attended by one hundred and twenty-five persons.

Speeches of congratulation were made by Division Line Superintendent Robinson of the Plant Department, District Commercial Superintendent A. R. McGrath of the Commercial Department, Division Auditor Sprague of the Auditing Department, and Division Traffic Supervisor George E. Palmer of the Traffic Department. Former General Manager C. H. Gaunt of the Pacific and Lake Divisions, in presenting Mr. Edwards with a handsome diamond stickpin and seal ring, said:

"We have gathered to honor Mr. Edwards, but not to say good-by to him, because the move from Chicago to New York merely enlarges his sphere of activity, which will still include Chicago, and so he will continue to be among us, often in person, we hope; always in spirit, we assure him.

"Therefore, the usual pain of parting is obscured by the joy of good fortune which comes to us through this advancement, and in which we all feel some share.

"The sagacity and the wisdom of your most competent New York officers are shown in his selection for preferment. Incidentally, as Mr. Edwards came from New York here, his selection shows also that these controlling authorities recognize the West as a proper training ground for men from whom big achievement is expected later in New York.

"The good things said tonight do not and cannot express a full measure of the praise due to Mr. Edwards.

"A man of sterling integrity, skilled in his profession, forceful in authority but with humane understanding, tempering the hardships of others, he has been more than an individual to you and to me. He has become an institution, to which others turn for counsel and assistance, always ungrudgingly given by him, and because of his thoroughness potent and effective.

"And now, Mr. Edwards, these friends of yours which your good qualities have tied to you in inseparable bonds of respect and affection, have made my hand the vehicle to place into yours this token. They wish it to symbolize in perpetuity all of the expressions of tonight which they have tried to make meet the desire of their hearts in engraving upon your own the impress of their lasting esteem."

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IN URUGUAY, the office of Telegraphic Codes and Communications, established by the law of May, 1911, is to be under the direction of the ministry of the interior.

## THE CABLE.

A RECENT ISSUE of the *Traffic Bulletin* of the Associated Press contains an account of the press service established throughout Central and South America, by means of which twenty-five newspapers in the Southern republics are now receiving reports of from 500 to 3,000 words daily by telegraph. The writer of the story pays a well earned tribute to the Mexican Telegraph Company and the Central and South American Telegraph Company —All America Cables—for the co-operation extended in inaugurating and maintaining the cable connections necessary in rendering the news service.

## Cable Staff Changes.

EASTERN TELEGRAPH COMPANY: A. G. Whittley, London to Alexandria; F. N. Laycock, London to Suez; A. N. Prosser, Gibraltar to Suez; J. K. Hastings, J. H. Cooper and D. A. W. Deed, London to Marseilles; T. A. Wright, Mozambique to Durban; C. Orange, C. L. Young, and E. K. Ling, Marseilles to Aden; Q. Henry, Aden to Bombay; P. G. Ford, Aden to Perim; B. W. H. Anstee, and G. Ingersoll, Zanzibar to Mozambique; F. Hurlstan, Quelimane to Durban; L. J. H. Wood and M. E. Northey, Mozambique to Zanzibar; F. A. Beaty, St. Helena to Ascension; A. G. P. Clinton, and H. F. L. Skey Duban to Delagoa, and T. A. Wright, Mozambique to Durban.

PACIFIC CABLE BOARD: L. C. Gladding, R. T. Atkins, A. J. Ker, and A. R. Collins, Auckland to Suva; F. H. Harrison, Suva to Sydney; K. G. Barker, Bamfield to Fanning; F. E. Noad, Bamfield to Melbourne; W. D. Fowlie, Halifax to Bamfield; E. Schutz, Southport to Suva; H. F. S. Allom, Fanning to Auckland, and R. T. Skinner, Montreal to Fort William.

WESTERN TELEGRAPH COMPANY: A. G. Douglas, Pernambuco to Rio de Janeiro; H. M. Sieyes, St. Ingo to St. Vincent; A. S. Waterton, Montevideo to Pernambuco; H. F. Slater and H. R. Wright, Montevideo to Rio de Janeiro; W. Humphreys, Rio de Janeiro to Montevideo, and J. E. Williams, London to St. Vincent.

EASTERN EXTENSION TELEGRAPH COMPANY: D. R. Hillier, W. H. S. Clark, R. Taylor, and A. R. Whyte from London to Singapore; E. Hobden, E. J. Munro, L. V. Rolfe, A. W. Taylor, and G. T. Morrell, from Singapore to Cocos; H. H. Wilson, F. P. Poltock, E. E. Franklin, C. Hall and F. J. Atkins, from Singapore to Cocos; W. F. Morgan from Singapore to Batavia; K. A. Sclanders, Singapore to Banjoewangie; R. M. Macalpine, Batavia to Labuan; J. Ingram, Banjoewangie to Singapore; B. Storey, Singapore to Darwin and G. L. S. Grant, from Cape St. James to Singapore.

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## RADIO TELEGRAPHY.

DR. LEE DE FOREST has been on the Pacific coast during the past month on a business trip.

CAPT. E. H. ARMSTRONG, research assistant to Prof. M. I. Pupin, Columbia University, New York, and who was a member of the Signal Corps staff in France during the war, has returned to New York.

WILLIAM DUBILIER, consulting radio engineer, during the war manufactured in his New York factory a great many of the mica-type high tension radio condensers used by the United States Signal Corps in radio signaling.

PHILIP E. EDELMAN, radio expert, Minneapolis, Minn., during the war was engaged in chemical research work for the government in New York and Washington.

WARREN F. HUBLEY, treasurer of the Institute of Radio Engineers, New York, is president and general manager of the American Transformer Company, East Orange, N. J.

CHARLES V. LOGWOOD, at one time associated with the Poulsen radio interests on the Pacific Coast, is now chief engineer in the De Forest laboratory, New York.

JOHN MILLS, author of the book "Radio Communication," is a member of the engineering staff, Western Electric Company, New York.

M. E PACKMAN has rejoined the faculty of Dodge's Institute of Telegraphy, Valparaiso, Ind., as radio instructor.

LIEUT. WILLIAM PRIESS, formerly radio officer in the Signal Corps, A. E. F., after carrying on supervision of manufacture for the Signal Corps in this country, has resigned his commission. He is at present associated with the Wireless Specialty Apparatus Company in Boston.

GEORGE ELTZ, after resigning his commission in the navy, has returned to the research laboratory of the Western Electric Company. Mr. Eltz was associated with naval aviation radio.

LIEUT. HARRY SADENWATER of the Naval Aviation Service, was radio officer of the NC-1. A cablegram sent by him from the Azores tells the story of the flight in graphic terms: "Plane lost—crew saved—some adventure." Lieutenant Sadenwater was formerly radio inspector in the Department of Commerce.

E. M. KINNEY of the General Electric Company has made a series of interesting radio measurements in airplanes during the war, for the navy. The measurements of constants of antennas on a vibrating airplane, a mile up, has taxed experimental ingenuity.

### Marconi Company Wins Important Patent Litigation.

DEGREE AGAINST COMPANY FORMERLY OPERATING GERMAN STATION ON LONG ISLAND.

In a decree recently signed by Federal Judge Mayer, the Marconi Wireless Telegraph Company of America has again been successful in patent litigation under the Fleming Patent No. 803684 granted November 7, 1905, to Prof. John Amborse Fleming of England, the famous Marconi wireless expert, which patent is owned by the Marconi Company. The patent covers the audion, known as one of the most sensitive instruments for use in wireless telegraphy and telephony, and the decree obtained by the Marconi Company is directed against the Atlantic Communication Company, which operated the high power wireless station at Sayville, Long Island, prior to the war, in connection with German interests.

The Sayville station was built prior to the war and was finally taken over by the United States Government, so that no injunction could issue in this suit, but now the Federal Court has held that the receiving apparatus employing audions infringes the Marconi Company's Fleming patent and excludes the Atlantic Communication Company from all rights in the invention.

The court has appointed Judge E. Henry Lacombe, formerly presiding judge of the United States Circuit Court of Appeals for this Circuit, as a special Master to ascertain the amount of damages to be assessed against the defendant company, the assets of which are all in the hands of the Government.

### Radio Company of America.

The Radio Company of America has filed articles of incorporation with a capital of $100,000, to engage in the establishment of wireless telephone and telegraph service throughout New England. It is proposed to erect the main plant at Auburn, R. I., headquarters of the company to be at Providence.

### Fire Hazard of Radio Transmitters.

According to M. LeRoy, in a recent issue of *Comptes Rendus,* it is possible for inflammable materials such as cotton, oily waste and similar substances to be ignited from a distance by wireless. A number of conflagrations have occurred, and sparks from wireless have been thought to have been the cause. An inflammable resonator was made and so arranged that inflammable substances in close proximity could be ignited. This fact suggests that greater care will have to be exercised to prevent wireless from creating sparks that will cause fires.

IT IS REPORTED from Ecuador that most of the material has arrived in Guayaquil for the radio telegraph station for which the government contracted with the French Radio Electric Company. The engineers who are to install the plant will arrive shortly with the remainder of the material.

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### Institute of Radio Engineers.

At the regular monthly meeting of the Institute of Radio Engineers, held on June 4, in the Engineering Societies Building, New York, T. Johnson, Jr., expert radio aid of the navy, delivered a paper entitled "Naval Aircraft Radio." The meetings of the Institute are being well attended by radio, land-line telegraph, and telephone engineers.

### Chinese Radio.

It is reported from Peking, China, that on May 26, an agreement was signed between the Marconi Wireless Telegraph Company and the Chinese government for the formation of the Chinese National Wireless Telegraph Company, with a capital of $3,500,000. Half of this sum is to be subscribed each by the government and the Marconi Company.

The Marconi Company will manufacture wireless apparatus in China with Chinese labor and also maintain existing and future wireless installations. A factory will probably be established at Shanghai, with an auxiliary repair shop at Tientsin, or Peking for the maintenance of stations.

### Marconi Notes.

L. C. EVERETT, engineer, who has been in Buenos Aires. Argentina, several months on business of the company, has arrived in New York.

WILLIAM A. GRAHAM, of the commercial department, has returned from a business trip to Cuba.

A. C. FORBES, of the engineering department, who was formerly located at the Marconi station at Bolinas, Cal., has been released from the Navy and reentered the Marconi service at Marion, Mass.

ALEX E. REOCH, engineer, is engaged in special engineering work for the company at Buenos Aires.

LAWRENCE O. MALARIN, superintendent of construction at San Francisco, has been promoted to the office of marine superintendent of the Pacific Division at San Francisco.

WALTER E. WOOD, recently released from the Navy, has been appointed superintendent of the Marcori station at Chatham, Mass.

THE OFFICE of the Marconi Company in Chicago has been moved from the Transportation Building to 510 Bonheur Building, 326 River Street.

### Books on Wireless.

TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York, is headquarters for all books on wireless telegraphy. Those desiring such books should send for our price list. We make it our business to fill all orders the same day they are received.

## PROGRESS OF GOVERNMENT CONTROL OF TELEGRAPHS AND TELEPHONES.

Postmaster General Burleson issued the following statement on June 5:

The President having recommended the return of the wire systems and the control of the owning companies with certain legislation designated to stabilize their operation, and the Senate committee having taken action looking to their immediate return, and the House committee in its hearings on the proposed legislation having indicated concurrence in the suggested immediate return with or without legislation so recommended, I feel it my duty to now return the actual control of operations to the companies. Some days ago I directed the necessary orders to be prepared to accomplish this and have today issued same. These orders do not affect questions of rates and finance with which the Congress may determine to deal. The rates now in force and the financial relations between the government and companies, and the order of October 2, 1918, prohibiting discrimination because of union affiliations, will continue unless Congress in its wisdom may decide to change them or the "emergency" is terminated by the proclamation of peace.

By the action now taken, however, the wire companies resume actual control of operations of their respective properties and are free to formulate and put into effect their own policies unrestricted by Government control, which is to continue in any case a few weeks and thus be able to prepare themselves for a complete resumption of the management of their properties. It will be necessary for each company to keep its accounts during the continuance of the government control that its books may be closed on the day government control ends, in order that a full and accurate statement may be promptly made when it is called on for same.

The following telegram was sent out on June 5 to all officials by Clarence H. Mackay, president of the Postal Telegraph-Cable Company:

"On and after today the following officials of the Postal Telegraph-Cable Company, removed by Postmaster General Burleson, are restored to the positions formerly held by them in connection with the operation of the lines of the Postal Telegraph-Cable Company; namely, Clarence H. Mackay, president; William W. Cook, general counsel; Edward Reynolds, vice-president and general manager, and A. B. Richards, general superintendent."

The Senate Interstate Commerce Committee on June 6, in the face of Postmaster General Burleson's statement that the telephone and telegraph companies were still under his control despite his order of the day previous took steps to expedite action by Congress restoring full control of the various systems to their private owners within ninety days.

Following a meeting of the committee, at which the Postmaster General's statement was read, Senator Cummings, Chairman of the committee, late in the day, obtained permission of the Senate

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to have the resolution offered by Senator Kellogg, providing for the return of the systems within ninety days, advanced on the calendar as unfinished business.

The letter which Mr. Burleson sent to Senator Cummings, Chairman of the committee, read as follows:

"An order issued by me on June 5 relative to the operation of the telephone and telegraph systems has been construed by some as actual return of the properties to the owners. No such action has been taken by me nor is any contemplated.

"This order simply dissolves the operating board appointed by me under date of December 13, 1918, and directs that the systems be again operated by the regular operating officials under government supervision. Responsibility of the government to the systems in no wise collides. It being evident that these properties are to be returned in the very near future, it was necessary for the Postmaster General to take steps immediately to set up the regular operating organization of the companies so that when the properties are turned back it can be done without confusion to the service, which was the purpose of the order. This order in no wise affects the legislation pending before your committee or before Congress. It will enable the companies to begin steps immediately to prepare the data and collect their information to submit to the state commissions for the rate cases, which will probably be taken up immediately after the period of government control ends."

Increased railroad, telephone and telegraph rates ordered by the railroad administration and by the Postmaster General, respectively, were sustained on June 2 by the Supreme Court, which held that the war powers conferred by Congress upon the President included sweeping control over the railroad and wire systems, with "supreme and conclusive" authority to fix intrastate rates.

These questions were decided in two opinions rendered by Chief Justice White, the one relative to the railroad rates, being unanimous, while Justice Brandeis dissented in the telephone and telegraph decision, but without rendering a separate opinion. The opinions affect litigations which have been instituted in about forty states.

## The Strike.

When Postmaster General Burleson's order for the return of control of operations of the wire systems to the companies owning them on June 5 was made public, S. J. Konenkamp, president of the Commercial Telegraphers' Union of America, at once issued orders extending the Atlanta wire strike to cover the Southeastern part of the country, and that the strike would be extended to include all of the companies at 6 A. M., Eastern time, June 11.

The response to the Commercial Telegraphers' Union's call for a nationwide strike of telephone and telegraph workers, ordered to begin on June 11, evidently did not meet with the results expected by the union officials.

Postmaster General Burleson after the strike order had gone into effect characterized it as unjustifiable.

Newcomb Carlton, president of the Western Union Telegraph Company stated that out of a total of more than 40,000 employees that were appealed to in the strike agitation by the telegraphers' union, a total of 175 were absent from their work. Only eleven men were away in New York. Of this small number he had no doubt that many were kept away by illness or other causes not related to the strike. "So far as the Western Union Company is concerned," he added, "the strike is a complete failure."

Edward Reynolds, vice-president and general manager, Postal Telegraph-Cable Company, said: "The more experienced and intelligent members of our operating force refused to go out, because they regarded the strike against the Postal lines as entirely without justification."

Percy Thomas, in charge of the strikers in New York, said that reports from the country indicated that the strike against the Postal had been successful, but added that a sufficient number of men had not gone out in the Western Union offices to tie up their wires.

Other union leaders declared that the first day's response to the call for a nationwide strike of commercial telegraph operators gave promise that the tie up will be complete in three days, despite the claims of the company officials that the strike has failed. Reports received by the Associated Press from many towns in various sections of the country indicate that commercial telegraph business was not seriously interrupted in most districts, and that the outlook for the strikers was anything but encouraging.

As we go to press the telegraph situation is rapidly becoming normal.

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MANY OF OUR READERS will be interested to hear that W. D. Gregory, formerly well known in telegraph circles of St. Paul, Chicago and Pittsburg, is now a successful oil broker at El Paso, Tex. We have known Mr. Gregory since away back in the early 80's and heartily congratulate the disciples of "John D" on this new acquisition to their ranks.

Mr. Gregory has long represented TELEGRAPH AND TELEPHONE AGE and will continue to do so in addition to his new line of business. His advertisement appears in another column of this issue. As Mr. Gregory is a business man of many years' experience we predict for him much success in his new field of endeavor.

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ENRICO GMUER, Post Office Box 27, Wall Street Station, New York, whose advertisement appears in another page of this issue, is a well known manufacturer of Milan, Italy. He requests that manufacturers of telephone, telegraph and general electrical apparatus, should communicate with him through Post Office Box 27, Wall Street Station, New York. Mr. Gmuer, who has been established in the electrical business in Italy and Switzerland for many years past, wishes to enlarge his field of operation by including electrical goods of American manufacture. Mr. Gmuer is highly endorsed by the R. G. Dun Mercantile Agency, Milan, Italy, Branch.

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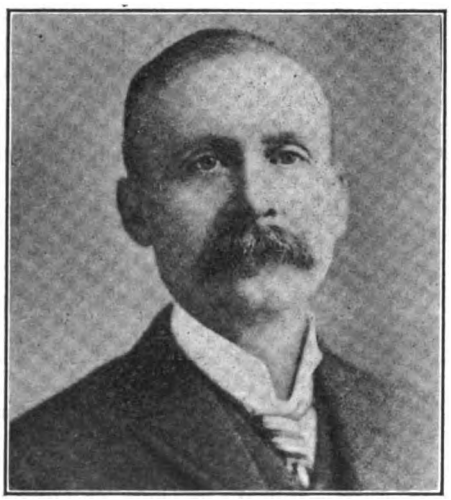
## UNION PACIFIC AND CENTRAL PACIFIC RAILROADS JOINED FIFTY YEARS AGO.

On May 10, 1869, the last spike joining up the Union Pacific Railroad and the Central Pacific Railroad, was driven at Promontory Point, Utah. The event was observed with elaborate ceremony, a gold spike being driven by Leland Stanford, Governor of California, and telegraph circuits were arranged from Promontory Point to all sections of the United States, prearranged "dots" on the sounders marking the blows delivered to the last spike connecting up the East and the West by rail.

A number of telegraphers alive today remember hearing the signals transmitted over the wires, and there is at least one of the old-timers still vigorous, who was in the telegraph service in Utah at the time the railroad was connected through—Levi S. Wild.

On May 10, this year, a Golden Spike Jubilee was held at Promontory Point, and the Salt Lake City, Utah, *Tribune*, in referring editorially to the event, under the caption "Pioneer Telegraphers," said:

"The golden spike jubilee brings to mind another great public utility which began to flourish in Utah half a century ago—indeed, was one of as much service in its own way as was the joining of the Union Pacific and Central Pacific Railroads. We refer to the telegraph service.



LEVI S. WILD

"Fifty years ago the Western Union Telegraph Company was completing plans for the removal to Corinne, Utah, of its relay office—the main office of the service in these parts. Three months after the event at Promontory Point the change was made. Six telegraph operators took up quarters in a tent at Corinne, staked upon a field of mud. One of those six was Levi S. Wild, now of Butte, Mont. It is probable that he is the only survivor of the pioneer operators who did duty in the place which many believed would become the metropolis of the region.

"Mr. Wild handled much of the press matter that was written, on the joining of the roads, by special correspondents for their respective newspapers. It was a great news item and the reporters spared neither themselves nor the telegraphers who transmitted their copy. Hundreds of thousands of words were forwarded.

"At this time Mr. Wild is on the pension roll of the Western Union, which company he served almost without intermission for more than fifty-three years. At the time of his retirement from active duty he was manager of the Butte office. In another way Mr. Wild assisted in perfecting the telegraph service in the Rocky mountains. He was one of those engaged in the building of the first wire line from Corinne to Virginia City, in Montana, an enterprise with which former Senator William A. Clark was prominently identified."

### THE FAMOUS CORINNE RELAY OFFICE.

Prior to the completion of the railroad with its accompanying telegraph pole lines, the overland telegraph relay office was at Salt Lake City, Utah. There were then but two single lines east and west. Shortly after the railroad was opened for traffic it was decided to make Corinne, Utah, a few miles west of Ogden, the telegraph overland relay office. The force at Salt Lake City consisted of Henry Pratt, Aaron Hilleker, John Clowes, Pat Kearney, Mark Croxwell, and Levi S. Wild. When the equipment was installed at Corinne, Salt Lake City became a local office only. The first staff at Corinne consisted of Frank B. Knight, George F. Brown, Henry Pratt, Pat Kearney, Gus Meade, and Levi S. Wild. Messrs. Clowes and Croxwell remained in charge of the Salt Lake City office, and Mr. Hilleker returned East.

In the course of years the Corinne office was reduced in importance, the relaying being done at Ogden and Salt Lake City, but while Corinne lasted it was the stamping ground of some of the most expert telegraphers in the country, and to have a "sine" in that office was the equivalent, professionally, of working a heavy wire in New York or Chicago.

## TELEGRAPH GIRL RETURNS FROM OVERSEAS.

Being the girl behind the telegraph instrument is not the most exciting occupation in the war, according to Miss Zora Lucille Scott, of Omaha, Nebraska, just returned from overseas service as a telegrapher with the Red Cross in France.

"We sat at rows of desks all day long," Miss Scott says. "They were just the same as any other row of desks in any other office.

"The messages we sent may have been the means of saving hundreds of lives; they may have built bridges or burned them; or they may have been directing some minor office detail. None of us knew.

"Ours was not to make reply or reason why; ours was to stick at our desks and keep on sending. If we could have seen the effects of some of the telegrams we sent, no doubt we should have had a thrilling time of it. As it was, our work was a daily grind, with nothing heroic or thrilling about it."

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# RAILROAD TELEGRAPH SUPERINTENDENTS ANNUAL MEETING HELD IN CHICAGO, JUNE 11, 12 AND 13

The convention of the railroad telegraph superintendents held in Chicago June 11-13, was well attended by railroad telegraph executives and engineers from all parts of the United States and Canada. In the July 1 issue of TELEGRAPH AND TELEPHONE AGE will appear a complete list of all those present with a report of the proceedings, reports presented, and discussion thereon.

In addition to the superintendents whose photographs were reproduced in our June 1 issue, and those appearing in this issue, the following named gentlemen took an active part in the committee work done during the past year: R. F. Finley, chairman of Committee No. 2; I. C. Forshee, member of Committees 2 and 4, and sub-chairman in connection with Committee No. 2; Worth Rogers, telegraph and telephone engineer, South Western Region, U. S. R. A., and C. A. Worst, superintendent of telegraph, Chicago, Burlington and Quincy Railroad.

WILLIAM BENNETT
Superintendent of Telegraph
Chicago and Northwestern Railroad, Chicago, Ill.

W. J. CAMP
Assistant Manager of Telegraphs
Canadian Pacific Railway, Montreal, Que.

The report of Committee No. 6 covered the subject "Mailgrams, censoring, filing time, adequate address, use of symbols and code."

The revised regulations governing the telegraph and Telephone Division, Section 1, Operating, of the American Railroad Association, presented to the Chicago meeting by President M. H. Clapp, are as follows:

REGULATIONS.

1. The Division shall include those actively connected in official or supervisory capacities with railroad telegraph or telephone service. Affiliated members may be appointed by the Committee of Direction.

2. There shall be a Committee of Direction, which shall consist of eleven representatives of members within the Division, including the chairman and the first and second vice-chairmen of the Division, the two past chairmen of the Division last holding office, and six representatives of members; and a Committee on Nominations of five members to be elected annually by the Division.

The Committee of Direction shall conduct the business of the Division, shall authorize, order, define duties, fix the number of and appoint the members of such committees as may be necessary to investigate and report their findings and recommendations upon any subject to be considered by them. For the present there shall be the following committees:

Committee No. 1—Construction and Maintenance—Outside Plant.

Committee No. 2—Construction and Maintenance—Inside Plant.

Committee No. 3—Protection Against Electrolysis.

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Committee No. 4—Protection Against Lightning or Electric Light and Power Circuits.
Committee No. 5—Telegraph and Telephone Development.
Committee No. 6—Message Traffic.
Committee No. 7—Editing.

3. Regular meetings of the Committee of Direction shall be held quarterly, the date and place to be decided by the chairman. Special meetings of the committee may be held at the call of the chairman.

Regular meetings of the Division shall be held in March and September, the time and place to be designated by the Committee of Direction at least sixty days in advance. The September meeting shall be the annual session. Special meetings may be held at the call of the Committee of Direction.

R. R. HOBBS
Superintendent of Telegraph
Louisville and Nashville Railroad, Louisville, Ky.

Meetings of any committee may be held at the call of the chairman of such committee.

4. The Committee of Direction shall offer the names of ten representatives of members, not officers of the Division, as candidates for the Committee on Nominations.

5. It shall be the duty of the Committee on Nominations to offer to the annual meeting of the Division the names of one representative of a member as candidate for chairman and one for first vice-chairman and one for second vice-chairman, and the names of twelve representatives of members as candidates for the Committee of Direction, from which six members are to be elected.

Nominations for officers or membership on the Committee of Direction or Committee on Nominations may be made by any representative of a member at the annual meeting at which such officers or members of committees are elected, provided such nominations have been endorsed by ten representative members.

6. Officers, excepting as otherwise herein provided, shall be elected at the annual meeting of the Division held in September each year, and the election shall not be postponed except by unanimous consent.

The chairman, the first and second vice-chairmen and members of the Committee of Direction and the Committee on Nominations of the Division shall be elected by printed ballot each year, the candidates receiving the majority of the votes cast shall be declared elected and shall hold office for one year or until their successors shall be elected.

7. The right to hold office, vote and attend executive sessions shall be vested in representatives of members only.

W. P. CLINE
Superintendent of Telegraph
Atlantic Coast Line Railroad, Wilmington, N. C.

## Construction and Maintenance—Outside Plant.

REPORT OF COMMITTEE NO. 1.
TELEGRAPH AND TELEPHONE DIVISION,
UNITED STATES RAILROAD ADMINISTRATION.
PRESENTED AT THE CHICAGO MEETING, JUNE 11.

REPORT OF SUB-COMMITTEE (a) MAINTENANCE AND CONSTRUCTION OF POLES.

At the annual meeting of the Association of Railway Telegraph Superintendents, held in Chicago, December 5 and 6, 1918, Sub-Committee (a), Pole Lines, reported a plan for pole line specifications involving complete independence of any other organization or company. In proceeding with the work currently assigned to it, your committee at first expected to follow the above plan. However, upon being advised that the Western Union Telegraph Company had under consideration a revision of its specification C-79-A, it was decided to

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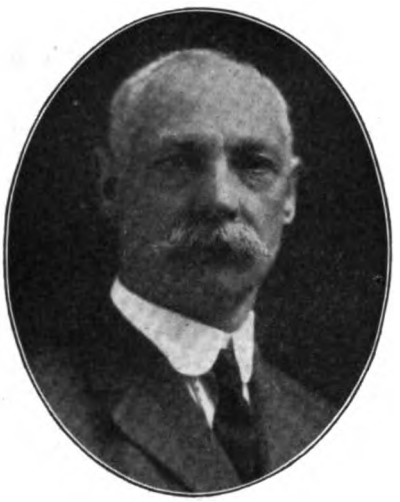
ascertain whether, through joint action, uniform specifications satisfactory to both railroad and telegraph interests might not be developed, and this having been found feasible, recommendations on that basis are now made.

Some of the pole and wire lines along railroads belong to the railroads, some to the Western Union Telegraph Company, some to the railroad companies and the Telegraph Company jointly, and a short mileage is of miscellaneous ownership; but as the lines in which the railroad and telegraph companies have a joint interest (in effect a partnership) are largely in the majority, the desirability of uniform specifications is obvious

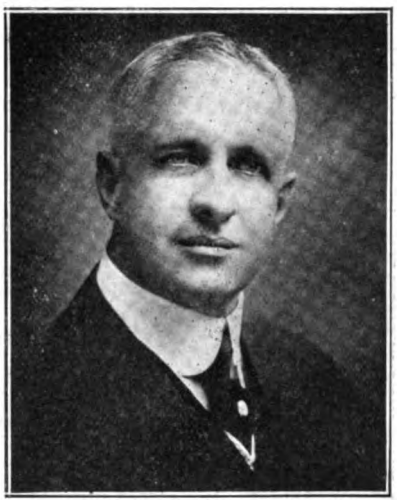


J. J. ROSS
Superintendent of Telegraph
Michigan Central Railroad Company, Detroit, Mich.

The American Telephone and Telegraph Company, at the request of the committee, sent a representative to the meetings at which the specifications were considered, so that the committee's investigations have been made with the assistance of the largest pole line owning companies of the country.

The preliminary draft now presented includes fifteen of the proposed sixteen sections, but in general without the official drawings and without certain appendices yet to be decided upon. It provides for three grades of line according to the character of the circuits carried; viz., special trunk lines, trunk lines, and non-trunk lines. The specifications also divide the country into four pole line districts, determined by the severity of the climatic conditions, which are designated as extra heavy, heavy, medium, and light, respectively. The specifications provide for the construction of the proper class of line to meet the climatic conditions in each of the four pole line districts. The map which accompanies the report does not show certain small sections in which it may be necessary, on account of special climatic conditions, to vary the type of construction proposed in general for that pole line district. These small localities can only be delineated on the map after detailed investigation. The highest class of construction may be required in short sections within a territory where climatic conditions in general indicate a lower class of construction to be sufficient, or vice versa.

The various grades of lines to be built under these specifications are to be fitted to the climatic conditions of the territory in which they are located, to provide the necessary stability to properly safeguard the general operating conditions encountered. Further careful consideration of special features is necessary, however, in order that the general economy which is absolutely essential may not be lost by attempting to cover such special cases in the general specifications.



W. H. HALL
Superintendent of Telegraph
Missouri, Kansas and Texas Railroad

The committee presents this as a progress report, asks for approval of the plan submitted for the several grades of construction and the principles of their application, and for instructions to proceed in the further development of the specifications as planned.

## Wire Crossings.

REPORT OF SUBCOMMITTEE B, WIRE CROSSINGS, TELEGRAPH AND TELEPHONE DIVISION, AMERICAN RAILROAD ASSOCIATION.

At the annual meeting of the Telegraph and Telephone Division of the American Railroad Association, held in Chicago, June 11-13, Sub-Committee B, Wire Crossings, made the following report on the proposed revision, by the Bureau of Standards, of Section 28, Signal Lines Crossing Over Railways, of Circular No. 54, National Electrical Safety Code:

"On February 1, 1919, President Clapp, of the Association of Railway Telegraph Superintendents, was requested by Dr. M. G. Lloyd, of the Bureau of Standards, to have the Association criticize the Bureau of Standards' proposed revision of Section 28, covering Signal Lines Crossing over Railways, which work was turned over to the Association's Wire Crossing Committee, who considered

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the matter at a meeting in New York on February 21. Later, the activities of the Association having been taken over by the Telegraph and Telephone Division of the American Railroad Association, Chairman Clapp appointed the following Wire Crossing Sub-Committee: E. C. Keenan, Chairman; G. A. Cellar and L. S. Wells. Stanley Rhoads was appointed by the Sub-Committee, engineering assistant.

"The Wire Crossing Sub-Committee of the Telegraph and Telephone Division considered the Bureau of Standards' proposed revision at committee meetings on March 10 and 27. At the March 27 meeting, Sub-Committee B conferred with Mr. Edwin B. Katte, representing the Committee on Electrical Workings of the A. R. A., and the committee on Electricity of the American Railway Engineering Association, who concurred in the recommendations of our Sub-Committee.

WORTH ROGERS
Telegraph and Telephone Engineer
United States Railroad Administration
Southwestern Region

"The recommendations of Sub-Committee B were presented to the Bureau of Standards at a conference in Washington on April 3, 1919.

"Section 28, as orginally printed in Circular No. 54, followed closely the existing wire crossing specifications of the Association of Railway Telegraph Superintendents, which were based on existing practice. In the proposed revision the Bureau of Standards wish to have the rules governing Signal Line Crossings over Railways based upon engineering principles with proper assumed loading, so as to be consistent with other sections of the Safety Code. While the proposed revision, as shown by this first draft, is generally based upon proper engineering fundamental principles, it contains some articles which, in the opinion of our Committee, are not consistent with good railroad engineering practice, and the changes we propose indicate our ideas.

"Members of the Telegraph and Telephone Division are requested to go over the draft of the proposed revision, as issued by the Bureau of Standards, and the recommendations made by the Sub-Committee.

"It is the intention that Sub-Committee B shall, as soon as the Bureau of Standards finally issues its revision of Section 28, get up detail specifications for wire crossing over railroads, as well as parallels or conflicts between signal lines and power lines.

## Belgium Needs Telephone and Telegraph Material.

In Belgium the telephone and telegraph system is owned by the Belgian government. During the German occupation a great quantity of material and accessories was destroyed or taken away by the enemy, so there is a great need of material at the present time.

American firms who wish to make offers for the sale of electrical apparatus or other material for telegraph or telephone installations might be interested to know that bids should be submitted to the Administration des Telegraphes et des Telephones, Hotel des Postes et des Telegraphes, Place de la Monnaie, Brussels. Each bid, according to official information just received at the consulate, should be accompanied with descriptions, photographs, etc., when it has to do with apparatus. As for the cables, specifications must be given, and whenever possible, samples should be sent.

## New Western Union Telegraphic Code, Five-Letter Edition.

The New Western Union Telegraphic Code, Five-Letter Edition, has recently been placed on the market and the large sales of the book testify to its rapidly growing popularity. The business man needs this work, and when he sees it he instantly adopts it. The book contains 380,000 phrases, each phrase being represented by a five-letter word. These words are pronounceable singly or when two of them are joined together. The latter results in the saving of fifty per cent in cable tolls. The book weighs fifteen pounds, contains about 2,000 pages and measures thirteen inches in length by eleven inches wide, and is three and one-half inches thick. There is no waste space in the book. Every telegraph manager should call this book to the attention of his customers. The price is $30.00 per copy and it is on sale at the office of TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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## CABLE CENSORSHIP DURING THE WAR.

### Telegraph Men in Charge of Censorship Rendered Service of Vital Importance to the Government.

Now that the office of the United States Naval Cable Censor at No. 20 Broad Street, New York, is finishing its work and is about to close, some of the interesting details of its operation in the war may be told for the first time. Censoring hardly seems like an appropriate job for the navy, but it was intrusted to that branch of the service because of the necessity of preventing enemy communication regarding ship movements. If it had been in the hands of any other bureau, there might have been delay and red tape which would have been fatal to the thousands of soldiers. Of course, the army and the Post Office Department had liaison officers, but the work was done by the navy.

The censoring of the mails was done by a board composed of representatives of the Army, Navy and Post Office Department. When the Naval Cable Censor's office was running in full force it had a personnel of 760, sixty of them being officers. About half were yeomanettes. Some of the female sailors had never worked before, but they stuck to their job and made excellent records. All of these sailors were pledged to the strictest secrecy regarding their work. Some of them had access to information which would have been invaluable to the enemy. It need hardly be added that there was never a leak.

#### RESPONSIBILITY OF CENSOR.

To the cable censor fell a large part of the responsibility in enforcing the Trading With the Enemy Act, the law which spelled economic ruin for German merchants and trade sympathizers in all parts of the world. By cutting off communication of blacklisted firms it was made practically impossible for them to carry on any business of import or export. Once a firm was put on the blacklist, it usually tried to fool the censor by adopting a "cover" name or by doing business through a "cloak." It did not take long for the various intelligence agencies to discover this subterfuge. But the most important duty of the censor was to prevent the sending of military information over the wires. Although it is not permitted to give names, it may be said that the activities of some of the cleverest of the enemy's secret agents were revealed through messages which they tried to send. Valuable information regarding suspects under investigation was also obtained by careful watching of his cables. It may be added that only when the chief censor at Washington, for reasons of policy, permitted it, were these messages allowed to proceed to their destination. Perhaps the most interesting phase of the work was the collection of the thousands of pages of data concerning persons and firms all over the world. The British had been censoring the cables for more than three years before we started, so, naturally, they had amassed a great fund of information, which had been collected into a huge volume. Numerous copies of this thoroughgoing work were furnished to the United States Government.

#### WORK BEFORE WAR.

Long before we went into the war the Bomb Squad (later the Neutrality Squad) of the New York Police Department, under Inspector Tunney, and the Secret Service, under Captain Burke, had done a great deal of work in ferreting out the secret agents of the Central Powers in this country. Their files were storehouses of facts.

Lieut. George S. Wheat, a reserve officer, who had been a reporter on New York newspapers for a good many years, was assigned to collate as much of this information as he could. Through the co-operation of these bureaus, Lieut. Wheat gained access to their files and had experienced newspaper reporters condense the information and place it on cards, so it would be easily accessible for the censors.

An arrangement was also made with the War Trade Board by which the reports of its various agents were received. Through the State Department came thousands of reports from consular agents all over the world.

The navy itself also had its attaches around the globe. In addition to these, each naval district also has an Aide for Information, and special branch offices of naval intelligence were established in New York, San Francisco, Chicago and other centers. The branch office in New York was commanded by Lieutenant Commander Spencer Eddy, well known through his work in the Diplomatic Service in several countries.

#### SUSPICIOUS MESSAGES REFERRED.

Whenever a cable message was regarded as suspicious it was referred to one of these agencies for investigation. From all these sources was collated a mass of data, probably more extensive than contained in any other one place. The information was put on cards, which were alphabetically arranged. Before a cable message was passed, all names mentioned in it were first looked up in these cards to see if any of them had a bad record.

A high naval officer pointed out that the mere existence of the censorship prevented the attempt to send many messages whose effect would have been harmful. The would-be sender, knowing his message would be subject to the most careful scrutiny, must have desisted in many cases.

The first commander of the New York office of the censorship was Capt. A. M. Hoff, who later went to sea in command of the *Oregon*. He was succeeded by Lieutenant Commander George Barr Baker, who was sent to Europe on a special mission. The next skipper of the good ship *Censor* was Capt. A. T. Graham, who was subsequently assigned to the Naval Overseas Transportation Service. The present chief is Lieutenant Commander L. E. Lindsay, who has been in charge since last August.

The Chief Cable Censor at present is Admiral Bullard, who is stationed in Washington, and has supervision over the officers at San Francisco, Gal-

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veston, Panama, Honolulu, Key West, San Juan and Guantanamo. Capt. D. W. Todd, his predecessor, was recently assigned to sea. The total personnel of the censorship in time of war was about one thousand.

CABLE COMPANY EMPLOYEES.

The telegraph and cablemen engaged in censorship work at the central censorship bureau, 20 Broad Street, New York, were: Western Union Telegraph Company; Lieutenant P. J. Tierney, Ensigns Edward M. Duncan, John F. J. Carter, George Reilley, and R. T. Carter; Chief Yeomen, Robert McDonald, Joseph A. Murray, Harry Hall, and Yeoman 1st Class, John W. Barrett. Commercial Cable Company; Lieutenant T. E. Hurdus, Ensigns J. Shea, W. M. Keefe, T. Conroy, G. A. Brown, and J. Hughes. French Cable Company; Ensigns, M. J. Martin, P. N. Larrissey, C. F. A. Boulton, and Yeoman 2d Class, A. Burns. Central and South American Telegraph Company; Lieutenant E. W. Phelan, Ensigns F. C. Stratt, Jr., J. V. Love, T. J. Ryan, and R. G. Neff.

## "WHAT IS ELECTRICITY?"

### Communication From Willis H. Jones.

*To the Editor of Telegraph and Telephone Age*:

If further and more practical evidence is desired to support my contention that all material bodies are simply different quantities and arrangements of the one common or basic element which we call electricity, as I stated in my article in your April 16 issue, let me call attention to recent discoveries of Dr. Harry B. Cox of Los Angeles, Cal.

Strange to say what he proposes to do, and claims can be done, is something I have often prophesied would eventually revolutionize present methods of curing diseased tissues. This will all be accomplished, I claimed, by means of electricity applied in just such quantities and strength and length of time as may be required to neutralize, or resolve the disease parts into their original healthy state, *i. e.*, turn them back to the mother source.

Radium, as well as all so-called medicines, generates electricity which, in my opinion, constitutes the "curative" element. So far the success of medical practitioners has depended solely upon how near they could *guess* the quantity required. Furthermore, as Dr. Cox remarks, they were handicapped by not being able to "shut it off" when the cure was completed, as the radio energy continued and caused new disease in healthy tissue.

If true, then all that remains to perfect the new method is to ascertain by observation just what quantity, strength, and time of application each so-called disease demands for a cure. These factors can then be regulated by means of ordinary radial-arm rheostat, cut-off, switch or other equipments.

Dr. Cox Says:

"The force of radium radio activity destroys, or causes to decompose, any material with which it comes in near contact. It is used literally to burn out diseased tissue. Under existing circumstances radium has been anythng but a success, because the effects of it continue to burn until it is a dangerous thing to use.

"With this new process, just as much of the radio activity as is wanted can be used. The quantity can be regulated as easily as the control of a stream of water in a faucet or the flow of electricity through a rheostat. It can be conducted to the point of an electrode and applied to any part of the human body.

"My discovery is due to the fact, that I gave up the task of discovering what radio activity really is and devoted my energies to attempting to create the activity by artificial means.

"Like light and sound, radio activity is composed of waves, and my only claim is that I have found the rate of vibration which causes the waves necessary to make objects radio active. This, in short, is what I mean by producing radio activity.

"To what limits the power can be applied, what can be done with it, remains yet to be seen. I have found a way of creating the power and, in all probability, will allow others to devise methods of using the energy. There are many mechanical and photographic possibilities.

"The question of utilizing the discovery in a medical way, to me, has the greatest present appeal. I feel that it will be responsible for a cure of a disease which until now has been deemed incurable. If this is true, I am satisfied."

### Introducing the Telegraph in Chile.

It is stated that when the electric telegraph was introduced into Chile, strategy was resorted to in order to guard the poles and wires against damage on the part of the natives and to maintain the connection between the strongholds on the frontier. There were at the time between forty and fifty captive Indians in the Chilean camp. General Pinto, in command of the operations, called them together and, pointing to the telegraph wires, said:

"Do you see those wires?"

"Yes, General."

"I want you to remember not to go near or touch them, for if you do your hand will be held, and you will be unable to get away."

The Indians smiled incredulously. Then the General made them each in succession take hold of the wire at both ends of an electric battery in full operation, after which he exclaimed:

"I command you to let go the wire!"

"I can't!" cried each Indian.

The battery was then stopped. Not long after the General restored them to liberty, giving them strict instructions to keep the secret. This had the desired effect, for, as might be expected, the experience was related in strictest confidence to every man in the tribe, and the telegraph remained unmolested.

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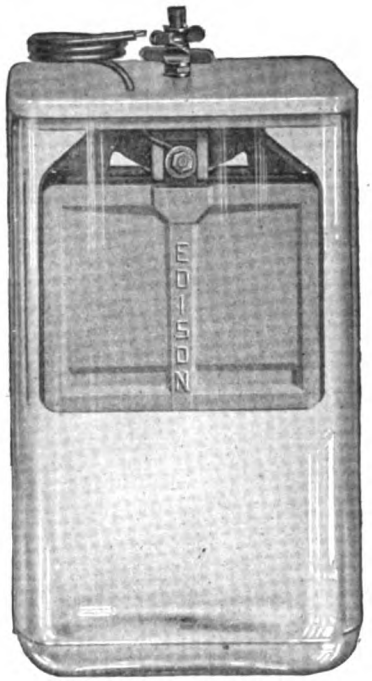
# FOR CLEAR TRANSMISSION




EDISON PRIMARY BATTERY DIVISION

THOS. A. EDISON, INC.

BLOOMFIELD, N. J.

# HALL SWITCH & SIGNAL CO.

**GARWOOD, N. J.** **CHICAGO**

*MANUFACTURERS OF THE*

## *GILL SELECTOR*

**THE UNIVERSAL SELECTOR FOR TELEGRAPH AND TELEPHONE**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GUIDED

by facts, not theories
by performance records, not claims
by experience, not prophecy. Every
consideration points straight to KERITE
for permanently satisfactory and economical service.

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NEW YORK CHICAGO


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## THE RAILROAD.

G. W. HULSIZER, superintendent of Telegraph of the Chicago and Alton Railroad, died on May 30.

### Talk by Telephone From Train.

The train telephone, working with wires and railroad tracks, was used successfully on the Philadelphia and Reading Railroad last week. Conversation was carried on between a moving train in Jenkintown, Pa., and the offices at the Reading terminal. Only one section of track had been wired, but officials said that the experiment assures, that virtually every train on the division soon will be equipped.

## THE TELEPHONE.

A. D. JONES, toll testboard man, New York Telephone Company, has been appointed wire chief at Watertown, N. Y.

G. W. KNOBLOCK has been appointed toll testboard man at Utica, N. Y., of the New York Telephone Company.

### "The Wire Devils."

The above is the title of a new book written by Frank L. Packard, author of several well known popular novels. In "The Wire Devils" Mr. Packard has produced a book based upon the surreptitious use of a railroad company's telegraph wires for criminal purposes. The "gang," composed of ex-telegraphers and ex-linemen, stage many exciting events which keep the railroad company's detective force on the jump day and night for a long period.

The deviltry of the stunts arranged by the ex-operators is palliated somewhat by a romantic and chivalrous streak in the makeup of "The Hawk," who is the chief plotter. The book contains more sudden twists of fortune and exciting moments than any telegraph novel ever before written.

The price is $1.50 per copy, and it may be obtained from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

### American Institute of Electrical Engineers.

THIRTY-FIFTH ANNUAL CONVENTION.

The thirty-fifth annual convention of the American Institute of Electrical Engineers will be held at Lake Placid, N. Y., June 24-27.

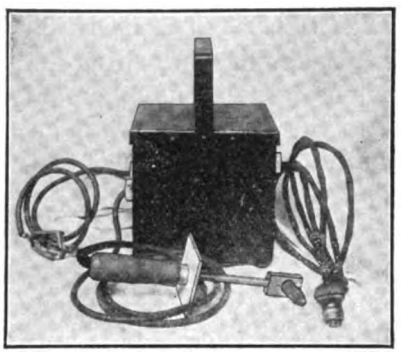
The technical program has been somewhat curtailed in order to leave ample time for the consideration and discussion of Institute policies at conferences under the auspices of the Committee on Development. Numerous modifications of the Institute's activities are being suggested which demand the attention and study of the entire membership.

## INDUSTRIAL.

ELECTRIC LEAD BURNING SET.

The lead burning set shown in the accompanying illustration is to be used in place of the gas flame lead burning outfit, for assembling loose plates and straps and for burning on connectors.

The set is connected to any electric light socket on the 110 volt alternating electric lighting system and is operated in a manner similar to the use of an electric soldering iron. Any degree of heat may be obtained and is under perfect control by simply varying the pressure at the point of contact.



Any one can operate the set. A skilled operator is not required, as in the case of the gas flame outfit. There are no gas fumes to contend with.

The current consumption is about equal to a 300 watt electric lamp, or in other words, the cost of operation is about five cents per hour on a basis of an electric power charge of ten cents per kilowatt-hour.

The dimensions of the set are: 8 inches by 7 inches; weight 30 pounds. It is manufactured by the Spence Electric Company, New York.

### Submarine Cable Working.

"Beginner's Manual of Submarine Cable Testing and Working," by G. M. Baines, is a book of 265 pages dealing in a thorough manner with the operation of submarine telegraphs.

The first four chapters contain elementary matter relating to batteries, electrical laws, etc. Chapter V. covers copper resistance of cable, instrumental zero, false zero, theory of false zero test; and in the following eighteen chapters up to date matter is incorporated explaining cable insulation tests, inductive capacity of cables, tests for broken cables, curb transmitter, mouse mill device, recorder adjustment and other matter which should form a part of every cable man's technical knowledge.

The price of the book is $4.50, and copies may be obtained from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

IN COLOMBIA, telephone service is to be established over existing telegraph lines between Bogota and several outlying towns.

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# GOOD BOOKS

**TELEPHONE CONSTRUCTION, INSTALLATION, WIRING, OPERATION AND MAINTENANCE. By W. H. Radcliffe and H. C. Cushing, Jr.**

This 165 page book contains a large amount of practical information of immediate value to those who are studying telephone circuit connections and who wish to learn how to install telephone apparatus. The chapters on telephone line construction and telephone line and cable testing are particularly complete. The price is $1.00 per copy.

**GOVERNMENT TELEPHONES. By James Mavor.**

This book is a compelling and fearless narrative of the true record of an American Government in the management of a great commercial enterprise. It tells what happened to the rates and what happened to the finances; what happened to the consumer and what happened to the taxpayer. The book contains 164 pages. Price, $1.00 per copy.

**MODERN AMERICAN TELEPHONY. By Arthur Bessey Smith.**

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# SIGNAL CORPS JOB TO PROVIDE NERVE SYSTEM FOR A. E. F.

From the days of the Greek torch bearer to wireless, the art of signaling has been perfecting itself until in this war its possibilities imposed upon the Signal Corps of the American Army the duty not only of keeping every part of the vast organization between front line trench and Washington in liaison but of discovering and reporting enemy movements as well.

An army without a signal corps would be like a man without a nervous system. It could not make a single co-ordinated movement. The great network of wires from company to battalion and from battalion to regimental headquarters, thence on to divisional, army and general headquarters, later interlaced with another great system of lines in the services of supply, and finally extending back more than three thousand miles to the Commander in Chief of the army himself, is patterned curiously both in function and action after the nervous system of the human body.

Through this system of nerves the guiding brains of the army received information and the resulting commands were sent out to the centers of action.

### TWO SPECIAL FIELDS.

The Signal Corps of the A. E. F. was charged with two special fields of action—the construction, operation and maintenance of a general system of communication by telegraph, telephone and radio in the Service of Supply, and communication by every practical means within and between fighting units.

The way in which the Signal Corps met these responsibilities can never be measured in dollars and cents, and yet it is interesting to know that a very conservative estimate places the money earning power of that organization as a telephone and telegraph company alone, during the war, at $6,650,000, apportioned as follows: Telegrams, 8,685,960 $4,600,000; telephone calls, local, 25,184,500, $1,130,000; telephone calls, long disance, 870,148, $920,000.

The A. E. F. Signal Corps operated 125,550 miles of lines, of which 38,750 miles were combat lines maintained under the most dangerous and trying conditions at the front, and only 20,336 miles were lines leased from the French. Its telephone lines ran through 396 head central offices and 14,854 telephone stations, of which 125 central offices and 3,064 telephone stations were at the front. It had 198 telegraph offices, 64 of which were with the advance armies.

There are times when figures, however large, seem to shrink before bigger things. For example, work of the radio section of the Signal Corps saved thousands of lives in the St. Mihiel drive. The location of enemy radio stations the night before the attack of September 12 was the determining factor in the decision of the intelligence section that the Germans had not withdrawn from the region despite almost overwhelming evidence to the contrary. At the time the sending of the infantry forward without artillery support was being seriously considered. Thanks to the alertness of our Signal Corps, even the enemy's plans for a counter attack were caught by our intercept stations three hours before it was to have developed.

### DESPITE SERIOUS LOSSES.

In a letter to the Chief Signal officer of the A. E. F., dated February 19, 1919, General Pershing said: "Each army, corps and division has had its full quota of field signal battalions, which, in spite of serious losses in battle, accomplished their work, and it is not too much to say that without their faithful and brilliant efforts and the communications which they installed, operated and maintained, the successes of our armies would not have been achieved."

The Signal Corps was essentially a combat organization, with three-fourths of its troops serving at the front. At the time of the armistice there were 1,000 officers and 27,000 members of its personnel on duty with the armies at the front, and only 462 officers and 6,038 men in the Service of Supply.

There should be mentioned in particular as augmenting this personnel 223 American women who came over from the States in six operating units. An army report says: "It is only fair to state that the good service rendered under nerve-racking conditions during the last strenuous months of the war when the big push was on was due in no small part to the reliability as operators and their untiring zeal and labor in the service." And some of these "hello girls" got right up into the midst of it, too. A unit under Miss Grace Banker, as chief operator, handled the heavy telephone traffic of the First Army Headquarters during two important operations—and handled it well.

### SIGNAL CORPS WITH THE ARMIES.

The accomplishments of the Signal Corps in battle and of that part of its personnel serving with the armies constitutes naturally the chapter of its work of which it is most proud. A field Signal Battalion of 14 officers and 459 men was attached to each army, army corps and division. Two telegraph battalions of ten officers and 212 men each were assigned for duty with each army and one with each corps.

The Field Signal Battalions were composed of a headquarters and supply section, a radio company

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and a wire and outpost company. The telegraph battalions were provided with motorcycles, trailers and trucks, all implements and materials for con structing and repairing telephone and telegraph lines.

Signal work was, of course, very different from trench and open warfare. In the last days, when the armies swept forward miles at a time, the signal men swept forward with them, stringing their lines as they went, and maintaining communication with bases principally by telephone. Radio was reverted to only when necessary.

In all our major advances our Signal Corps successfully maintained our lines, and an idea can be had of what this meant from the estimate of the French army that it took 620 miles of wire of all types for each half mile of front consolidated after an advance of six miles.

It was estimated by our own Signal Corps that an army of three corps advancing under average conditions should have a minimum automatic daily supply of 2,500 miles of wire of all types, 500 pounds of tape, 800 dry batteries, an abundant supply of telephones, switchboards, telegraph instruments, radio equipment, and quantities of special and technical supplies, in addition to the regular reserve to be carried.

In trench warfare, also, telephone and telegraph lines were principally used, the wires laid underground in the regions near the front lines. The use of the telephone by our combat forces was so extensive that all other means of communication might be classed as auxiliary and emergency. By means of the " buzzer phone" telegraphic messages could be sent over the lines with practically no danger of interception by the enemy. Between company headquarters in the trench and battalion headquarters, underground telegraphy, or T. P. S., as the French called it, was used to supplement telephone communication. Then for the same purpose between battalion and regimental headquarters, trench radio was employed.

### SOMETIMES AHEAD OF INFANTRY.

The most interesting and spectacular modes of signaling in combat were employed only in emergencies. Generally, if the lines were cut, the Very pistol with its star shell cartridges or the 15-centimeter French projector could be used. Many times pigeons supplied the only means of communication, as in the case of the lost battalion in the Argonne. Runners, of course, played a large part in the relaying of messages after the fighting became continuously open last summer.

The Signal Corps men at the front, both in stationary trench warfare and in the open advances, did their work in the face of the same dangers and hardship that faced the doughboy, suffered heavily in losses, and gained richly in thrilling experiences worth while remembering. They went over the top with their comrades and oftentimes had to go ahead of the Infantry.

When the town of Vaux was captured June 30, 1918, because of a turning movement, a Signal Corps detachment reached the objective before the Infantry. A man was sent out to install a telephone. He found a likely looking dugout and went in, telephone in hand. He found nine Germans hurriedly packing up to move. He told them he wanted to put in a telephone. They objected and he insisted. A fight ensued, and the lone American was decidedly underneath, when one of the German soldiers spoke in Polish. Once again the cosmopolitan character of the American army saved the day. The telephone man was a native born Pole himself, and in a few minutes he had reinforcements, with the result that shortly after he emerged from the dugout with a broken telephone and nine prisoners, five of whom were Poles.

### COPYING GERMAN MESSAGES.

There was one kind of work done by the Signal Corps at the front which, for interest and daring, vies with anything the records of the war hold. This was the task performed by twelve officers and 402 men of the radio section, who maintained six different kinds of stations for keeping tabs on the enemy and policing our own lines to see that the enemy did not keep any tabs on us.

They had Intelligence intercept stations which copied messages in code from German ground-radio stations; airplane intercept stations which intercepted messages between enemy planes and ground stations; airplne goniometric stations which located enemy observation planes; control stations which supervised and policed the work of the American radio stations; goniometric stations which got bearings on enemy radio stations; and last, but not least, the listening stations which copied telephone and ground system messages of the enemy.

The story of how the Germans devised a new code for use at the front and of how the Allies got on to it before the Germans themselves, illustrates the *finesse* of our Signal Corps in this kind of work The new code was supposed to have gone into effect March 11, 1918. On March 13 an American intelligence intercept station caught a message from a German station which had just received a message in the new code, asking that the message be repeated in the old.

From the call letters given in the message it was possible to find both the original message in the new code and the repetition in the old. This assured the solution of the new code before the Germans themselves were familiar with it.

### CHANGING CODES AT INSTANT'S NOTICE.

As a contrast, and as a curious commentary on the much talked of German efficiency and American unpreparedness, when a code book was stolen from us by the Germans, not only was another code ready, but our operators were actually prepared to use it when the order went out to put it in immediate effect.

There is no more brilliant page in the romance of the war than the little history of the American listening stations of the Signal Corps. They were always to the front and sometimes in No Man's Land itself, but wherever they might chance to be

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located, they were, as one of the men described them, "very near Heaven." Their business was eavesdropping, and if they didn't hear any good of themselves, they managed to do the doughboy lots of good.

Loops of wire were constructed out in No Man's Land parallel to the enemy's lines, and the tiny electric currents induced in them were magnified by means of an amplifier. Copper mesh mats or metallic rods were buried as near the enemy wires as possible, and from them wires led to the amplifier. By this means ground currents and leaks from the enemy wires were magnified to audibility.

The planting of these "grounds" near the enemy's lines called out some of the most heroic instances of personal bravery and resourcefulness at the front. Time after time these men were caught by the spotlight of a star shell as they crawled out in the night toward the German lines, and were seen no more. Often they were caught between a double barrage probably started by their own sentry. More often, however, they wiggled their way through barbed wire and shell holes, planted their wires, and returned to reap the benefit of their daring.

The Research and Inspection Division maintained at Paris a laboratory for the development of apparatus to meet signaling requirements, tested out all new apparatus and inspected all signal supplies. Among the new devices credited to this division might be named a tank radio set, the two-way radio loop set for communication between advanced units, the American listening station equipment, the two-way T. P. S. set, mobile telephone and telegraph offices, a gun-sight lighting device; radio tractors and trailers and goniotractors.

An engineering section planned all Signal Corps installation. Finally, there was a section engaged with the preparation of our codes.

LARGEST MILITARY TELEGRAPH AND TELEPHONE.

The Signal Corps in the S. O. S. stood staunchly behind its front line work. It not only made it possible for any American unit in the S. O. S. to get in touch with any other, but supplied all the missing links between the S. O. S. and the actual advance areas. It operated at Tours the largest military telephone and telegraph office in the world, and two others nearly as large at Paris and Chaumont. The Tours office did more business than any commercial office in France except one in Paris alone.

In the fall of 1917, the increasing importance of A. E. F. activities in England made it necessary to arrange for our own cable across the English Channel. Accordingly, in January, 1918, a four-conductor cable was laid for the Signal Corps between Le Havre and the southern coast of England, which connected directly with London. The Signal Corps established large offices in London and lines were leased to the various camps and ports in England occupied by the A. E. F., such as Winchester, Southampton and Liverpool.

To the credit of the Signal Corps must be given one of the chief accomplishments of the war—the successful equipment of combat divisions with the special signaling apparatus required in modern warfare. Much of this, especially radio equipment, was new to America and had to be located in sufficient quantity in Europe. Up to the time of the armistice the Signal Corps bought in France $9,500,000 worth of equipment for its combat units, and another $1,500,000 worth of line construction material. Miscellaneous equipment for photography, research, meteorological work, schools and repair shops, to the value of $2,500,000 was also purchased in France. Of course, not all of this was paid for in cold cash, but by November 11 the Signal Corps had paid up bills to the amount of $4,500,000.

The Signal Corps maintained seven supply depots and three army parks, covering storage of 350,000 square feet, and an open storage space of 1,500,000 square feet. More than 100,000 tons of supplies were handled, 62,000 coming from the States, 37,000 from France and 1,000 from Great Britain.

And the work of the Signal Corps, with the troops and in the S. O. S., like the work of many other branches of the army, has not ended with the armistice. Indeed, the accomplishments of this department in extending and maintaining communications hundreds of miles into Germany and to Rotterdam and Antwerp, and of keeping the great scattering family of the American Expeditionary Force on speaking terms, would make a good story all by itself.

## New Book on Radio Telegraphy.

"Principles of Radio Telegraphy," is the name of a new book by C. M. Jansky, which covers the latest practice in radio engineering. The book contains 237 pages and has 179 illustrations.

The first four chapters deal with elementary electrical engineering as applied to radio work, and the remaining seven chapters go thoroughly into the subjects of electromagnetic waves, alternating currents, oscillatory circuits, radio circuits, practical transmitting appliances and methods, practical receiving appliances and methods, and vacuum tubes and their use in wireless telegraphy.

We recommend this fine work to all who are studying or who intend taking up the study of radio signaling.

The price of the book is $2.00 and copies may be purchased from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

TELEPHONE CONSTRUCTION, INSTALLATION, WIRING, OPERATION AND MAINTENANCE. By W. H. Radcliffe and H. C. Cushing, Jr. A guide for the installation of telephone exchanges in buildings and small towns. An extremely practical book. One hundred and sixty-five pages and 120 illustrations. Price, $1.00.

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# QUESTIONS AND ANSWERS

### Telephone Interference Factor.

W. R. P.—With the proper instrument at hand the pair of terminals on the top of the apparatus marked "Line" should be connected to the secondary of the potential transformer. If one side of this secondary circuit is grounded the "Line" terminal marked L*g* should be connected to this side. The pair of terminals marked "Meter" should be connected to the measuring instrument.

When making an observation with the apparatus the dial switch marked "Multipler for Meter" on the top should first be set at the value marked "40" before depressing the key which places the measuring instrument in the circuit. In case the deflection obtained is too small the key should be released and the dial switch set at the next value and so on until a satisfactory deflection is obtained. No switching either in the circuit external to the apparatus or with the switches on the top should be done while the key is depressed.

To obtain a value of the telephone interference factor the currents in the meter for the two positions of the double-throw double-pole switch should be read and recorded, together with the values of the multipliers used. These current readings are denoted $I_e$ and $I_i$ for the "Voltage" and "Current" positions, respectively, of the switch. If the settings of the multiplier dial switch be denoted $M_e$ and $M_i$, respectively, the telephone interference factor is given by the expression—

$$\text{T. I. F.} = 40\,\frac{I_i\,M_i}{I_e\,M_e}\ \text{microamperes per volt.}$$

This expression follows from the definition of the telephone interference factor as the ratio of the current in the meter branch of the network in microamperes to the potential across the network terminals in volts. $I_i\,M_i$ is the current in the meter branch of the network, and $I_e\,M_e$ the current in a 25000-ohm resistance across the network terminals, both expressed in milliamperes. Hence the current in microamperes is $1000\,I_i\,M_i$ and the potential in volts $25\,I_e\,M_e$. The ratios thus are:

$$\frac{1000\,I_i\,M_i}{25\,I_e\,M_e} = 40\,\frac{I_i\,M_i}{I_e\,M_e}$$

which is the expression given above.

### Harmonic Telegraphs.

A. P. S.—M. La Cour, assistant director of the Copenhagen, Denmark, Physical Observatory, in the year 1875 exhibited at the telegraph conference held in St. Petersburg, Russia, a system of multiple harmonic telegraphy employing an arrangement of electro-magnets and tuning forks. The principle of the system was practically the same as the telegraph of Elisha Gray, of Chicago, used on the early lines of the Postal Telegraph-Cable Company.

### A. C. and D. C. over One Wire.

J. M. C.—Yes, it is possible to transmit both an alternating current and a direct current over a wire simultaneously. Examples of this are the composite and simplex circuits of simultaneous telegraphy and telephony, and the phantoplex telegraph system. In the latter an ordinary direct current telegraph and an alternating current telegraph system are operated over one wire. Both of these systems are illustrated and described in the book, "American Telegraph Practice."

### Wireless on Railroads.

G. M. L.—Wireless communication was tried out in 1905 on the Chicago and Alton Railroad, between Chicago and St. Louis. At that time satisfactory communication was maintained for a distance of thirty-five miles from each terminal to moving express trains. The De Forest system was used. At Chicago there was a fifteen kilowatt station and at East St. Louis a ten kilowatt station. The Lackawanna Railroad tests with wireless telegraphy began in 1909. In 1913 the Lackawanna Company erected at Binghamton and at Scranton steel towers providing a total height in each case of 175 feet. Later a 400 foot steel tower was erected at Hoboken. The Hoboken station used a wave-length of 2,160 meters; Binghamton, 1,800 meters, and Scranton, 2,250 meters. The stations were not operated during the war.

### Cutting in on Through Wires.

M. C. F.—Way offices should not at any time cut in on through telegraph wires, unless instructed to do so by district wire chiefs. When these wires are operated as duplex, quadruplex or printer circuits, the signals transmitted are unintelligible on single line relays. Adding the resistance and inductance of your relay to the circuit disturbs the balance of the line for multiplex working.

### Early Selectors.

B. J. L.—Selectors practically the same in design and operation as those employed today were in service on Western railroads as early as the year 1888. In the early nineties Gill Selectors were extensively employed on the lines of the Great Northern Railroad in Dakota and Montana.

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# Electro-Physics for the Telegraph, Telephone and Radio Student

No. 7

So far in this series of articles we have avoided the use of mathematics, and in future lessons mathematics will be introduced only where necessary and in connection with sufficient text matter to lessen the difficulties of formulæ. At this point, however, it is instructive to present three or four diagrams which cannot fail to aid the student in picturing the phenomena that take place when electric oscillations are produced.

In order to describe the action of an electric condenser when charged and discharged, teachers often employ what is termed the "clamped steel spring analogy." If a strip of steel is clamped at one end and the free end is pulled to one side and

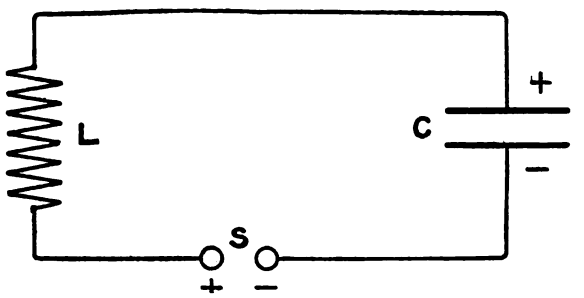


FIG. 1

released, this free end will not only return to its normal position but will swing past it, and returning it will execute a series of oscillations, each of which takes place in the same length of time expressed in fractions of a second, which will gradually die down to zero, and are then said to be damped. The free end returns to its original position because of the elasticity of the metal of which the spring is made, and travels beyond that point because of its inertia. The energy stored in the spring in pulling it to one side is thus gradually wasted in friction, and in a less degree by other forces acting upon it. Similarly, in electrical circuits we have to deal with capacitance, which corresponds to the elasticity, and inductance which corresponds to the inertia of the mechanical analogy.

Referring to Fig 1: If a condenser C is connected in circuit with an inductance coil L, and spark gap S, as illustrated in the diagram, and the electric potential of the condenser gradually increased an electric charge of high value may be stored in the condenser before the potential rises high enough to cause a spark at the gap S. When, however, the air gap breaks down due to the electric pressure, the charge in the condenser discharges

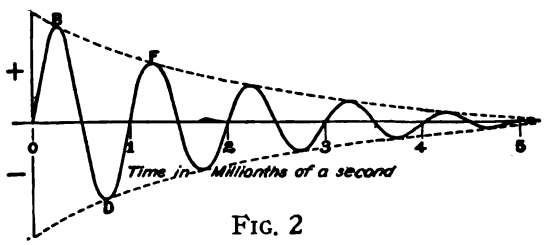


FIG. 2

across the gap and through the inductance coil; and, on account of the inductance (inertia) in the circuit it overshoots in the same way as the spring, then discharges in the opposite direction, and so on, so that the charge may oscillate back and forth many times across the air gap before the energy of the current is used up in heat and other losses, ultimately falling to a point where the potential is insufficient to bridge the gap.

The charged condenser, therefore, is the immediate source of electric energy which produces the high frequency oscillations.

The rapid oscillatory discharge through the inductance coil and the air gap shown in Fig. 1, takes place in the form of a series of decreasing oscillations. Fig. 2 is a diagrammatic representation of the manner in which the current oscillates from positive to negative over a stated period of time,


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in this case five one-millionths of a second. This diagram illustrates a train of damped oscillations, or damped wave-train.

Fig. 3 represents discharges in which the oscillations die down gradually, and are said to be feebly damped.

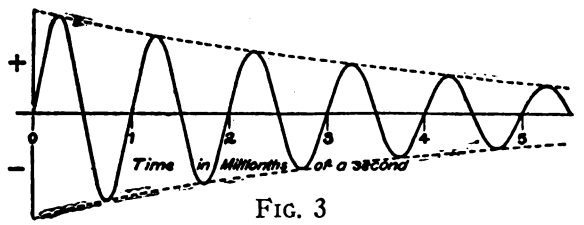


FIG. 3

A formula by means of which the frequency of oscillation of the discharge of a condenser may be computed is given herewith:

$$F = \frac{5{,}033{,}000}{\sqrt{L \times C}}$$

Where L equals the inductance of the leads connected to the spark gap, and C the capacitance in microfarads of the condenser.

This formula is reduced to its simplest terms, and means that a figure is to be obtained which is the square root of the inductance in henries multiplied by the capacitance in microfarads, and this figure then divided into 5,033.000 will be the frequency of oscillation in a given case.

*(To be continued.)*

## SHOP TALK.

### Instrument Adjustments.

BY THE OBSERVER.

Observing Western Union traffic circular No. 99, many operating department attendants seem to think it is necessary to take apart any instrument or piece of apparatus which can be dissected. To those who have gained this idea I would suggest that they once more read the circular, and this time carefully; afterwards reading the specification on the care of Wheatstone and combination relays. Harm often results from unnecessary tinkering with telegraph instruments. The little spring on the pole-changing transmitter occasionally is subjected to undue abuse. The proper way to remove the spring, when that is necessary, is to unscrew the two platinum pointed threaded screws—the battery contact screws—and allow the spacing post such position that will permit the armature to fall over to the right; helping it along by hand. With a pair of tweezers gently lift the spring off its hook. Too often the spring is removed without its tension being reduced, resulting in the spring being stretched, destroying its full usefulness.

To replace the spring two pairs of tweezers, or a small hook similar to a buttonhook should be used, and the spring carefully drawn through the arched aperture and slipped over the curved anchor where it remains. If two pairs of tweezers are used hold the spring by gripping it around its diameter, pulling it gently toward the arched aperture, then, by means of the other tweezers take hold of the open ring and slip it over the curved anchor, or its permanent position. In this operation do not lose patience, for these small springs will positively not stand rough treatment, and when they are bent out of their proper shape you may look for trouble in your pole-changer.

The writer has stated previously that armatures such as those on Morse relays and on double-magnet pole-changers should be straight up and down. Some attendants, rather than go to the trouble to move the three screws on the marking side of the pole-changer, will use the "battery" screws in adjusting the position of the armature relatively to the closed-pole magnet. When this is done the armature of the pole-changer is thrown in such position that the little spring is too slack, and the signals going to line will be uneven if not wholly unsafe.

Some attendants have the habit of taking apart the three, six, and seven point switches. This is work that can be done satisfactorily only by an experienced mechanic. When you have taken apart one of these switches and reassembled it, just cast a critical eye upon your job! You will likely be surprised to observe how inferior the switch is in every way to what it was before you dissected it. This matter is brought up merely with the hope that all attendants may realize that there should be no bull in our china shop. It is the right thing to do to read the printed instructions; but; like Davy Crockett: "Be sure you are right, then go ahead."

### Cable Codes.

TELEGRAPH AND TELEPHONE AGE is headquarters for all cable cipher codes. Telegraph managers would do well to bear this fact in mind when customers make inquiries regarding such codes. We are prepared to furnish full information on the subject, our knowledge being based on over thirty-five years' experience in handling the hundreds of codes on the market. Address TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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# Some War-Time Contributions to Scientific Advancement.

### THE VACUUM TUBE.

The thermionic vacuum tube, or audion, is mainly responsible for the recent remarkable developments in radio telephony. It comprises a highly evacuated tube containing a filamentary cathode, which can be heated with an electric current, an anode, and a grid-shaped electrode placed between the anode and cathode. The hot filament emits electrons, which are driven through the vacuous space to the anode (or plate, as it is commonly called) by a potential difference applied between filament and anode. The strength of the current which is thus established in the plate circuit can be varied by varying the potential difference between filament and grid, and this variation is produced with the expenditure of only a small amount of energy in the grid circuit. The thermionic tube can, therefore, beused as a power amplifier, and in properly arranged circuits, as a generator of continuous electric oscillations. Its characteristics also permit it to perform two other important functions in radio communication, namely, modulation and detection of high frequency oscillations.

### TUBES DEVELOPED FOR THE SIGNAL CORPS.

When the United States entered the war the thermionic tube had already reached a high state of development. For years it had been in extensive use as a telephone relay in the long lines plant of the Bell Telephone System. For military use, however, structures of special design were needed to meet the rough handling to which they might be subjected, or the severe vibrations of airplanes. Tubes developed by the Western Electric Company for army and navy use were designated by the Signal Corps as types VT-1 and VT-2, respectively.

Quantity production for military uses necessitated the formulation of specifications and the development of apparatus for testing and standarizing the operating characteristics of the various types. For example, the VT-1 was required to give a minimum power amplification of 200-fold. To test the amplification, a pure tone of 800 cycles is passed through a telephone receiver, or by throwing a switch it is transmitted to the receiver through the tube and an attenuating device such as an artificial telephone line. The attenuation is adjustable and the amplification is read directly from the dial, if the adjustment is such that the tone is equally intense for both positions of the switch. The box, which contains the generator of the 800-cycle sine wave, an artificial telephone line graduated in fifteen steps, and the necessary resistances, condensers and transformers, has over all dimensions of only 14" x 11" x 7½".

### TEST OF TRANSMITTING TUBES.

The transmitting tubes (VT-2) were designed to operate as oscillators and modulators and were required to give a minimum output of 3 watts over a wide range of operating conditions. Means whereby the tubes could be tested in the factory and under conditions approximating as nearly as possible the actual operating conditions were embodied in the test set shown in Fig. 1. The tube is plugged into the socket on the lid of the box, the filament and plate voltage are successively adjusted to their limiting values, and an indication as to the amount of power which would be delivered to an antenna is obtained from the meter.

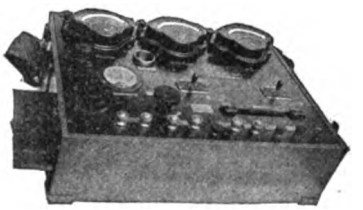

FIG. 1.
SCR-94 Field Test Set for Transmitting Tubes.

The varied phases of war service introduced new requirements in the mechanical construction of the tubes, particularly in airplane service, where the incessant vibration would produce noise in a detector or amplifier of improper design. To pass on all the changes of design incident to the speeding up of production and to test all tubes just before delivery, special machines were designed. In one of these, a plate, supported from springs, is operated from beneath by a belt-driven cam of irregular edge and face. Rollers fastened to the plate produce vibration in three directions, imitating the irregular vibration of an airplane. The resultant vibrations transmitted to the tube through the mounting pad of sponge rubber were very similar to, though somewhat more severe than, those actually observed in an airplane.

### VACUUM GAUGES.

The production of thermionic tubes in large quantities necessitated the development of very simple testing methods whereby the degree of vacuum obtained could be continuously indicated to the operators of the vacuum pumps in the tube factory. In this way any defects in the operation of any "exhaust station" would be noted before an appreciable part of the product suffered from imperfect manufacture, and a uniform product would be insured. Two types of precise and direct reading gauges were developed for use under factory rather than research laboratory conditions.

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### THE HOT WIRE GAUGE.

The hot wire manometer shown in Fig. 2 consists of platinum helix mounted in a suitable bulb and permanently attached to the apparatus in which the pressure is to be measured. One of these manometers formed part of the permanent equipment of each exhaust station. To observe the pressure, the helix is made one arm of a Wheastone bridge and the pressure is obtained from a relation, previously determined by calibration, between the resistance of the helix and the corresponding pressure. The

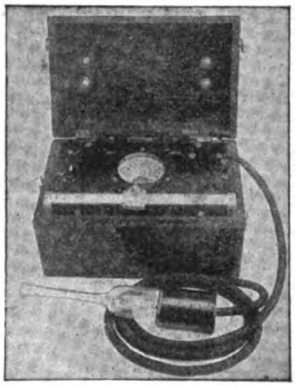

FIG. 2.

Hot Wire Vacuum Gauge.

bridge circuit has a slide wire calibrated to read directly pressures below 0.1 mm. of mercury, each division representing 0.001 mm. The bridge may be set for a certain pressure and the galvanometer continuously indicates variations about this pressure.

### THE IONIZATION MANOMETER.

In the ionization manometer an electron flow is established between a hot filamentary cathode and an anode in a suitable containing vessel. The positive ions produced by impact are collected by a negatively charged plate. The resulting current between this plate and the filament is proportional to the number of positive ions formed, and hence to the number of molecules and gas pressure. The pressure may then be read directly from the deflection produced on a portable microammeter.

Fig. 3 shows the ionization manometer and its associated apparatus. Energy for the cathode and for the ionizing current is obtained from 110-volt direct current mains. The filament current is adjusted by resistances which are automatically regulated by a relay. The ionizing current, passing between the hot cathode and the anode, passes externally through the relay coils which control the filament current, and hence, by temperature saturation, maintain the ionizing current constant at the required predetermined value. With 110-volt supply and 0.023-ampere ionizing current, the pressure is 0.0001 mm. for each 2 microamperes. This portable measuring set may also be used to measure the pressure in finished tubes, if these are inserted in the tube receptacle to which the manometer would otherwise be connected.

### VACUUM TUBE AMPLIFIERS.

The thermionic vacuum tube had been extensively used by the Bell System as a telephone repeater before and during the development of its possibilities as a modulator, which were first extensively indicated by the radio telephone transmission from Washington to Paris. The use of the device as an amplifier had resulted prior to the war in great progress in the technique of multi-stage amplifiers and their application to the measurement of very small amounts of electrical energy. The declara-

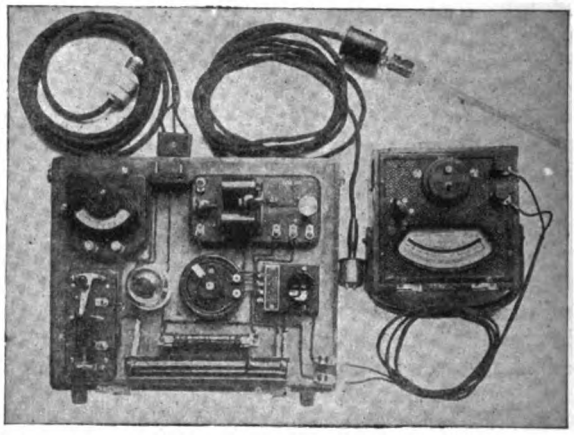

FIG. 3.

Ionization Manometer.

tion of war, however, resulted in demands for amplifiers to meet a great variety of experimental purposes. Even where such amplifiers were not part of the uultimate solution of the problem, their use frequently facilitated such solution. A change in the current in the circuit containing the plate and the filament, which is occasioned by a change in the voltage impressed between grid and filament, may be successively transmitted from tube to tube, so that a fraction of a milli-volt may be amplified sufficiently to operate an ordinary laboratory type of oscillograph.

### D. C. AMPLIFIER OF THREE STAGES.

Special circuit designs are required for multistage amplifiers when the voltage which is to be augmented is not an alternating voltage. Such an amplifier is of peculiar advantage, however, in studying the transient oscillations in transmission circuits. For example, Fig. 4 shows two oscillograms of the current passing through a long loaded cable at the 1st. 62d and 122d sections, respectively, when a direct current voltage is applied at the first section. The time required for the building up of the current at the respective sections is evident, and also the transient oscillations occasioned by the inductance and capacity of the transmission line itself. These transients do not persist throughout the entire current-time curve, the later variations of which are due to noise induced by neighboring lines. The 3-stage, direct current amplifier with which these oscillograms were procured is shown in Fig 5.

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### A 6-STAGE AMPLIFIER.

By the use of successive stages of amplification, enormous energy amplifications, *e. g.*, 10,000,000,000,000 times, have been obtained. The limit is determined by the energy capacity of the tube in the last stage and by the relative importance of the natural disturbances which occur in the input circuit of the first tube. A 6-stage amplifier permits the feeble energy derived from a telephone receiver, when employed as a transmitter, to light an ordinary tungsten lamp or to produce a sparking potential of several thousand volts.

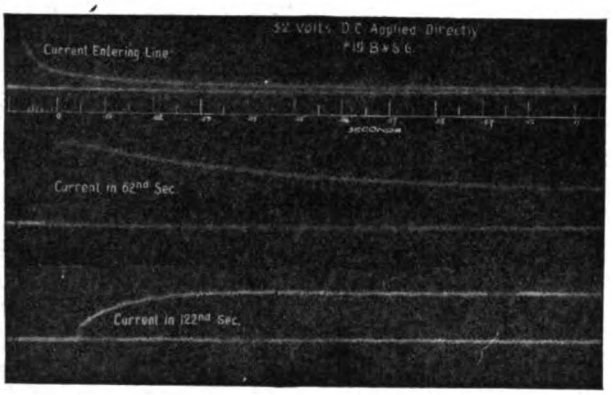


FIG. 4.

Oscillograms (see text).

### VACUUM TUBE OSCILLATOR.

The fact that these amplifiers are so remarkably efficient in developing an output many times greater than the input means that in any amplifier circuit if a sufficient portion of the output gets back into the input in proper phase relation, a sustained oscillation or "singing" will be set up, as every experimenter with amplifiers has discovered to his annoyance. A source of sustained electrical oscillations may, therefore, be obtained if a properly controllable feedback circuit is arranged, and essentially pure sine wave of oscillations be produced of frequency from one or two cycles to millions of cycles per second.

In the demonstration of this wide range of frequencies three different oscillatory circuits are employed, one operating to cause the vibration of the needle of a direct current meter, another that of a diaphragm of a loud-speaking telephone receiver, and the other operating a flashlight connected in the secondary of a high frequency, *i. e.*, oscillation, transformer.

### BRIDGE AND OSCILLATOR FOR HIGH FREQUENCY MEASUREMENTS.

Bridge methods for the measurement of the alternating current constants of apparatus or of circuits at telephone frequencies were extensively employed by the Western Electric Company and other members of the Bell Telephone System before the company became interested in radio communication. By modification these methods have been extended to permit bridge measurements at radio frequencies, and a practical form of bridge has been developed, which is compact and rugged and will permit of many different types of measurements. The frequency range covered by the bridge and its associated apparatus is from 20,000 to 1,000,000 cycles per second. From the lower limit to about 500,000 cycles the apparatus shown is limited in accuracy only by the standards which are used. Above this frequency the accuracy is not so great but is sufficient for general utility purposes. At these radio frequencies shielding is necessary, and the entire bridge is enclosed in a metallic covering.

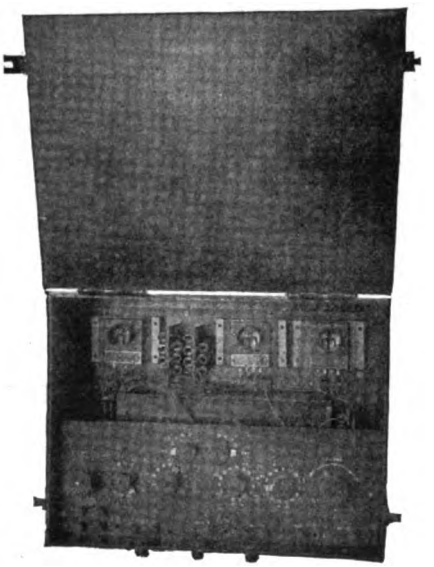

FIG. 5.

Direct Current Amplifier.

The bridge set comprises a generator, the bridge itself and a three dial resistance box (standards of inductance and capacity are separately mounted), the detector amplifier and the heterodyne oscillator. The generator circuit employs two vacuum tubes, so arranged as to develop a high frequency, which is independent of its current output. With it 10 milliamperes through 1,000 ohms is easily obtained. The detector amplifier involves three vacuum tubes and gives a moderate amplification of the beat note, *e. g.*, 400 to 4,000 cycles, which is obtained by the assistance of the heterodyne oscillator. The latter oscillator is a single tube circuit. Both the generator and the heterodyne oscillator are controllable in frequency by means of variable condensers and inductances.

## Good Book on the Telephone.

"THE PRACTICAL TELEPHONE HANDBOOK AND GUIDE TO THE TELEPHONE EXCHANGE," by Joseph Poole, has been revised and brought up to date in a 1918 edition. This work contains 724 pages of detail information in regard to all phases of telephone operation. Particularly timely chapters are those describing trunk-line working; underground lines; line loading; multiplex telephony, and submarine telephone cables. The price of the book is $5.00.

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## OBITUARY.

M. H. CRANE, a well known New York Telegrapher, aged 65 years, died at his home in Brooklyn, May 30. Mr. Crane was a native of Rhode Island and came to New York in the late seventies to work for the Associated Press. He later worked for the Publishers' Press and the United Press. Most of his telegraph career was spent with the various press associations.

CHARLES J. CHRISTIE, aged fifty-five years, one of the most widely known old time operators in Cincinnati, died on May 29. He was a native of Ohio and entered the telegraph service in 1879 at Cincinnati. Mr. Christie worked in the old 195 Broadway, N. Y. office, and in 1884 he left the service of the Western Union Telegraph Company to enter the journalistic field. From 1889 until 1896, he was connected with the Cincinnati *Enquirer*, first as a reporter and later as editor. He afterwards was managing editor of the Cincinnati *Commercial Tribune*, which position he held until 1900, when he was appointed secretary to Mayor Fleischman of Cincinnati, and was vice-mayor of that city from 1900 to 1903, when he accepted the secretaryship of the Fleischman Company which position he occupied until his death.

MRS. SOPHA J. SPANGLER, aged seventy-four years, died at Lebanon, Ohio, April 25, last. Mrs. Spangler was a veteran of the telegraph service on the Pennsylvania Railroad, having worked as operator on the lines west of Pittsburg in 1864 and 1865. O. L. McCreary, chief clerk in the Telegraph Section, United States Railroad Administration, Washington, is a nephew of the deceased.

## Electrical Education.

A large proportion of the graduates of the large universities which give electrical courses, when they leave college, enter the laboratories of the large industrial companies, and government electrical bureaus.

In the managing, construction and installation departments of operating companies and manufacturing companies there is a growing demand for practical electricians; men qualified to take up the task of getting work done. Telegraph and telephone employees living in towns and cities throughout the country, and who desire to enter the broader fields of the electrical industries, have open to them the thoroughly practical scheme of coming to New York, securing day work or night work in their regular line, and then taking up during their hours off duty a course such as that conducted by the New York Electrical School.

## Experimental Wireless Stations.

EXPERIMENTAL WIRELESS STATIONS. By Philip E. Edelman, 272 pages; 98 illustrations.

This book is intended particularly for experimenters in wireless telegraphy as a guide to a rational study of the art. One of the main objects of the book is to provide a standard design for so-called amateur stations, to take the place of the many varieties of hit and miss apparatus constructed and purchased by experimenters.

The matter has been written with particular regard to clearness, simplicity and direct usefulness, and among the subjects covered are: Nature and theory of wireless transmission; aerials; grounds and lightning protection; general features of transmitters; resonance; calculation of wave length, capacity and circuit; transformers; spark coils; transmitting condensers; design and construction of spark gaps; detectors; solid rectifiers; tuning; interference prevention; right of the experimenter, etc. A supplement contains much matter of value, which brings the book up to date and explains the audion, time signals, balancing aerials, vacuum valves, amplifiers, etc.

Copies of this book may be purchased for $1.50 each from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

## Electrical Instrument Making for Amateurs.

The above is the title of a book by S. R. Bottone, now in its eighth edition, which was written for the amateur experimenter who desires to learn electrical engineering principles by making electrical devices with his own hands. There are 272 pages and ninety-six illustrations, and detailed descriptions are given of how to make condensers, Leyden jars, induction coils, electroscopes, Tesla coils, magneto armatures, thermopiles, elementary wireless telegraph apparatus and many other pieces of electrical apparatus. The instructions are so simple that only inexpensive tools are required in making the instruments described.

The book sells for $1.35, and copies may be purchased from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

## Non-Battery Sounder.

The relay attachment manufactured by the Railways Labor-Saving Device Company, of Davenport, Iowa, which takes the place of the local battery sounder, continues to meet with favor in both railroad and commercial telegraph service. As a reading sounder the device is satisfactory, and the cost of local battery sounder is avoided.

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# Telegraph and Telephone Age

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## Our Business.

Most of the readers of this journal are engaged in the business of establishing and maintaining instantaneous long distance communication by electrical methods. It is a big business! The part this journal plays in the business is that of keeping in touch with all divisions of the general subject; disseminating information relative to improvements and technical advancement, recording official and personal news notes, and so on.

It is of advantage occasionally to pause for a moment to review what has been accomplished, where we are at, and whither we are headed.

In the great war just ended, telegraphy, telephony, and radio played vital parts in winning for our side the victory that is so decisive. Our engineers, operating managers, manufacturers, and workmen, all have received the highest commendation from the high governmental authorities for the splendid achievements of the past four years. Our methods and systems on all occasions measured up to the requirements of war. What delays and inconveniences were experienced within our own borders were in the main due to heavy transfers of men and materials to the seat of war, and unsatisfactory conditions at home are rapidly being rectified as this drain is shut off and the communication properties get back into the hands of their owners—those who recognize direct responsibility for service.

In the commercial telegraph field, the operators' strike has not attracted wide attention because it is only one of many strikes being conducted in various parts of the country. When the strike is ended several matters long in dispute will undoubtedly be cleared up, very likely to the satisfaction of both sides.

The recent experience of submarine cable interests in having their lines subjected to a volume of traffic greatly in excess of normal—greater than is likely to exist after the President returns home, has given to ocean cable invention an impetus that cannot fail to be of great value to the companies and to the public.

In the railroad telegraph and telephone field the recent convention in Chicago of the railroad telegraph superintendents, in its deliberations emphasized the growing importance of reliable instantaneous communication in railroad operation. Throughout all of the discussions at the meeting there was an undercurrent of realization that regardless of what has been accomplished in the past the future holds out attractive possibilities for the thinker, the engineer, the student. An observer might easily have gained the impression that although much good work has been done there is still much to do. The need is for additional thinkers and doers.

Accounts which we have recently published reviewing advances made in radio telegraphy and radio telephony form a record of which we may well be proud, and yet what has been accomplished along these lines carries with it promise of greater things to come.

In land line telephony material advances are in process of accomplishment.

The man engaged in the work of electric communication is in a live field—one in which the opportunities and possibilities are unlimited.

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# CURRENT EVENTS

## EXECUTIVE OFFICE ANNOUNCEMENTS, PERSONAL MENTION, APPOINTMENTS

### PERSONAL.

C. H. GAUNT, late general manager, Western Union Telegraph Company, Chicago, at the present time is in California on business.

J. FRANK HOWELL, president of the Consolidated Stock Exchange, New York, and a prominent old-time telegrapher, is in the South on a combined business and pleasure trip.

EDWARD J. MANION was elected president of the Order of Railroad Telegraphers at the convention held in St. Louis recently, succeeding H. B. Perham, who has held that office many years. Mr. Manion is forty-five years of age and his home town is New Haven, Conn.

E. W. PECK has been advanced to the head of the telegraph and telephone department of Armour and Company, Chicago, vice D. A. Carroll, retired. Mr. Peck is an expert telegrapher and has had long experience in railroad and commercial telegraph service.

J. G. CASE, organizer and secretary-treasurer of the Bankers and Merchants Telegraph Company in 1880, is recovering from pneumonia. He will spend the summer months at Liberty, New York.

H. H. EDWARDS, recently assistant superintendent of the government telegraph and telephone lines, Kingston, Jamaica, has arrived in New York and intends to locate in this country.

### POSTAL TELEGRAPH-CABLE COMPANY.

CHARLES M. BAKER, general superintendent of plant, Postal Telegraph-Cable Company, Chicago, Ill., was a New York visitor on June 11.

MANAGERS APPOINTED: Everet W. Rainbow, Muscatine, Ia.; L. Tupy, Niles, Ohio; R. E. Orgain, jr., Selma, Ala.; H. L. Barksdale, Meridian, Miss., and Francis Donohue, Herkimer, N. Y.

C. M. BREESE has been appointed night chief operator at Toledo, Ohio.

I. FELDMAN, who was a member of the 302d Field Signal Battalion in service in France during the war, has returned and is now manager of the Postal Telegraph-Cable Company's office in the New York *Times* office.

E. B. HAGERTY, for several years assistant chief operator in the service of the Postal Telegraph-Cable Company, New York, and during the war a Captain in the aviation service, is now engaged in the brokerage business in Wall Street, New York.

L. L. HOWELL, for several years traffic chief and traffic supervisor, in the service of the Postal Telegraph-Cable Company, Boston and New York, is now engaged in the brokerage business in Chicago.

At SPRINGFIELD, OHIO, the company's office will in the near future be moved to new quarters. The building at present occupied is to be razed. C. A. Winston is manager at Springfield.

### WESTERN UNION TELEGRAPH COMPANY.

A GROUP PHOTOGRAPH was recently made of Vice-President and Comptroller E. Y. Gallaher and a part of the staff of the accounting department. Those in the group are: E. Y. Gallaher; C. W. Carver, division auditor, Southern Division; C. A. Rhodes, division auditor, Pacific Division; W. McD. Milne, assistant auditor; J. J. Clunan, special agent; J. W. Rahde, systems and methods bureau; C. McKay, division auditor, Eastern Division; M. A. Porter, statistician; H. W. Ladd, general auditor; G. K. Huntington, assistant auditor; and M. Quinlan, special agent.

M. T. COOK, general manager, Pacific Division, visited Portland, Ore., June 3, to inspect the improvements recently made in the Portland office. Mr. Cook was accompanied by C. R. Fisher, division traffic superintendent, San Francisco; F. C. Cole, district commercial superintendent, and E. L. Ritter, district plant superintendent, Seattle.

U. G. LIFE, district commercial superintendent, Salt Lake City, Utah, has returned from an extended visit at the Pacific coast where he has been on account of ill health.

A MANAGERS' CONFERENCE was held in Des Moines, Iowa, June 5. Forty managers attended the meeting. Addresses were made by A. C. Kaufman, New York; A. D. Bradley, general manager, Cen-

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tral Dvision. Omaha, Neb.; J. L. Ferciot, manager, Omaha, and Homer White, manager Des Moines, Ia.

GEORGE M. EITEMILLER, during recent months employed in the Testing and Regulating Department at Denver and Rawlins, has retired on pension, having reached the retiring age. Mr. Eitemiller is a veteran of the Civil War, and has for a great many years been one of the most expert Morse telegraphers in this country, and also a sucessful chief operator and wire chief. He intends visiting eastern cities during the next few months and later will make his home in Kansas City, Mo.

A. A. PATTERSON, manager of the Bay City, Mich., office of the Western Union Telegraph Company, was recently elected a member of the Board of Directors of the Rotary Club, which body appointed him secretary. As Mr. Patterson is a hustling member of the Western Union family, the duties of the secretaryship of this club, although arduous, have been placed in the hands of a very efficient official.

## New York Western Union.

THEODORE A. BUSCH, for many years connected with the office of Superintendent W. A. Sawyer, first district, Eastern Division, recently returned from military service. Mr. Busch has been appointed in charge of the Uniform Depot, reporting to Mr. Sawyer.

THE OFFICE at No. 313 Fulton Street, Brooklyn, has been changed from telephone to Morse operation. Four Morse operators are employed.

JOHN D. PRICE, of Vice-President Willever's office, is making a special study of the delivery service in the Brooklyn district, being assisted by J. Lippman of Superintendent Hayden's office.

M. FRIEDBERG of General Superintendent J. F Nathan's staff, and John C. Tunner of the Employment Bureau, New York, attended the annual convention of the National Association of Employment Managers held in Cleveland, Ohio, May 21-23.

ROBERT MARSHALL, operator in the New York main office, was hit by an automobile about 2 a. m.. June 18, and suffered a fractured skull. Mr. Marshall was taken to the Knickerbocker Hospital and is in a critical condition. His brother, chief operator Joseph Marshall of Savannah, Ga.. was summoned to New York.

ONE OF THE Red Cross ambulances donated by the employees of the Western Union Telegraph Company, Walker-Lispenard Building, New York, was displayed at the entrance of No. 24 Walker Street, on Monday, June 2. This was the first opportunity the employees have had of seeing one of the two cars presented by them during the war. The ambulance was in charge of Red Cross ambulance driver, Miss Alma Bennet, who has the distinction of a 100 per cent. record in Red Cross ambulance work.

## Telegraph Baseball League.

The fight for the Metropolitan Division championship of the Western Union Boys' Baseball League is going strong and the games continue to attract much interest from the Western Union forces and the public as well. The New York *Evening Mail* (on Tuesdays), and the New York *Sun* (Monday morning), publish each week the box scores of the games and the relative standing of the four teams in the league.

Up to and including the game on Sunday, June 22, the teams stood as folows:

| | *Won.* | *Lost.* | *P. C.* |
|---|---|---|---|
| 2d District (Canal St. to 59 St.) | 4 | 2 | .666 |
| 3d District (North of 59 St.)... | 4 | 2 | .666 |
| 1st District (below Canal St.)... | 3 | 3 | .500 |
| 4th District (Brooklyn)..... | 1 | 5 | .166 |

The June games resulted in the following scores:

JUNE 1

1st Dist.—14; 9d Dist.—8 (Prospect Park)
2d Dist.—15; 4th Dist.—9 (Macombs' Dam Park)

JUNE 8

1st Dist.—9; 4th Dist.—8 (Prospect Park)
3d Dist.—11; 2d Dist.—1 (Van Cortlandt Park)

JUNE 15

2d Dist.—17; 1st Dist.—4 (Prospect Park)
3d Dist.—16; 4th Dist.—2 (Macombs' Dam Park)

JUNE 22

4th Dist.—14; 2d Dist.—8 (Prospect Park)
3d Dist.—7; 1st Dist.—2 (Van Cortlandt Park)

D. Drew, of Superintendent McCann's office, is manager of the 2d District team, which is tied for first place in the League with Manager Jacobs' 3d District team. After having had considerable difficulty in getting started, the latter team is now hitting its stride and is apparently going to be a serious contender for the championship. D. C. A. Sullivan is managing the 1st District team. As the result of heroic work on the part of Manager Donovan, the 4th District team from Brooklyn, which has been handicapped because of the scanty material at its disposal, has been showing steady improvement and, on June 22, had the pleasure of winning from the 2d District team—heretofore the champions—to the tune of 14-8.

### MESSENGERS' OUTING.

A number of Western Union messengers of the Metropolitan Division, who have been desirous to arrange an outing of Western Union boys, called a meeting at 33 Park Place, Monday evening, June 16, to form committees and make plans for such an outing. Messenger L. Rifkin of 65 Gold Street office was appointed temporary chairman, and the boys decided to take advantage of an open date—August 17—at Mungers' on the Beach, New Dorp, S. I.

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The following committees and chairmen were named: Arrangements, L. Griffin, chairman; baseball, N. Sheridan, chairman; field games, M. Masnowitz, chairman; dinner, J. Rabe, chairman; printing, H. Sussman, chairman; entertainment, A. Epstein, chairman; transportation, B. Fox, chairman.

## Increased Benefits for Employees of the Postal Telegraph-Cable Company.

Effective from July 1, 1919, payments to members of the Postal Telegraph Employees' Association for sick benefits will be increased so that, at the end of the first year of employment, 24 per cent. of the member's wage will be paid to him, instead of 15 per cent., as at present, and payments for additional years are also gradually increased according to the length of continuous service, up to 50 per cent. after twenty years' service, the old and new tables being as follows:

| Service. Continuous Years of | Per Cent. of Salary at Time of Incapacity Payable During Incapacity Under Present Scale. | New Scale. |
|---|---|---|
| 1 | 15 per cent. | 24 per cent. |
| 2 | 16 " | 25 " |
| 3 | 17 " | 26 " |
| 4 | 18 " | 27 " |
| 5 | 19 " | 28 " |
| 6 | 20 " | 29 " |
| 7 | 22 " | 30 " |
| 8 | 24 " | 31 " |
| 9 | 26 " | 32 " |
| 10 | 28 " | 34 " |
| 11 | 30 " | 36 " |
| 12 | 32 " | 38 " |
| 13 | 34 " | 40 " |
| 14 | 36 " | 42 " |
| 15 | 38 " | 43 " |
| 16 | 40 " | 44 " |
| 17 | 42 " | 45 " |
| 18 | 44 " | 46 " |
| 19 | 46 " | 47 " |
| 20 | 48 " | 49 " |
| 21 to 25 | 50 " | 50 " |

## New York Electrical Society.

On the evening of May 26, E. B. Craft, assistant chief engineer of the Western Electric Company, delivered a lecture on "War Developments in Electrical Communication—on Land, Sea, and in the Air." The talk was illustrated with lantern slides and moving pictures. At the same meeting A. M. Nicolson of the Western Electric Company gave an illustrated lecture on "Speaking Crystals." The subject of Speaking Crystals concerns piezo electricity as described in TELEGRAPH AND TELEPHONE AGE of April 16, 1919.

## James J. Welch,

DIVISION TRAFFIC SUPERINTENDENT.

James J. Welch, who, as announced in our June 16 issue, has been appointed division traffic superintendent, Lake Division, Western Union Telegraph Company, with headquarters at Chicago, was born at Pella, Iowa, and has served in practically every branch of the telegraph business except that of messenger boy.

JAMES J. WELCH.

Mr. Welch during his connection with the Western Union Telegraph Company has been employed as manager of the office at Des Moines, Iowa, chief operator of the Boston office, traffic chief, district traffic superintendent, division traffic supervisor, Chicago; traffic engineer, and assistant traffic manager of the cable system, New York. His advancement to the position of division traffic superintendent at Chicago brings to that office a telegraph man who has had thorough and wide training, and who with his official superiors and associates has high standing as an efficient, capable and fair minded official.

## Retirement of D. A. Carroll.

D. A. Carroll, well known telegrapher and for many years head of Armour and Company's telegraph and telephone department, Chicago, has retired on a pension after thirty-two years' service. The day Mr. Carroll retired, F. Edson White, vice-president of the company, in the presence of a large gathering of Mr. Carroll's coworkers presented him with a gold watch and chain, a completely equipped travelling bag and a pocket knife. These gifts were from Mr. Carroll's friends with whom he had worked for many years.

Mr. Carroll was born in Lafayette, Ind., where in early life he became a telegraph messenger and later an operator, taking service with the Cincinnati, Lafayette and Chicago Railroad (now a part of the Big Four system). After working at Fowler, Ind., and Earl Park, Ind., Mr. Carroll went to Kansas

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City, where he became wire chief. In 1887 he joined the telegraph staff of Armour and Company, Chicago, at first working a pony wire between the city office and the packing plant. There were then only three telegraph operators employed in Armour and Company's office. Today the company has 5,397 miles of leased wires which carry 10,000 telegrams per day, handled by twenty expert operators in the Chicago office alone; there being sixty-two additional telegraphers employed in the various branch offices and packing plants.

Employment as a telegrapher in the service of Armour and Company has always been looked upon by operators as a very desirable connection. The retirement of Mr. Carroll and the treatment he has been accorded by the higher officers of the company and his associates, calls attention to the fact that as long as he lives he will be an honored veteran of the company's service and will receive as a pension a sum the equivalent of two-thirds of his salary at retirement.

TELEGRAPH AND TELEPHONE AGE extends to Mr. Carroll all good wishes for a long and pleasant season of rest. He has worked long and faithfully and has earned the respect and goodwill of a host of friends.

## THE CABLE.

### Mexican Telegraph Company and Central and South American Telegraph Company Official Changes.

At a meeting of the Boards of Directors of the Mexican Telegraph Company and the Central and South American Telegraph Company, held in New York City, June 11, the following action was taken:

Edmund L. Baylies re-elected chairman of the Board of Directors of the Mexican Telegraph Company.

W. Emlen Roosevelt re-elected chairman of the Board of Directors of the Central and South American Telegraph Company.

John L. Merrill re-elected president of both companies.

Vice-presidents appointed for both companies: William A. McLaren, Alexander Davidson, and James R. Beard.

H. de la Montagne appointed secretary of both companies, vice James R. Beard.

William H. Coade appointed treasurer of both companies, vice Clarence Rapkin, retired.

Frank K. Warren appointed assistant treasurer of both companies.

Clarence Rapkin, who retires from the treasurership of both companies, first entered the service ot the Central and South American Telegraph Company at Panama, in 1882, being transferred to New York as auditor some few years later.

James R. Beard, who relinquishes the secretaryship of both companies, has held that office since their organization—the Mexican Telegraph Company, October, 1878, and the Central and South American Telegraph Company, June, 1879.

### Cable Communication With Germany.

The War Trade Board announces that it has been advised that all cable companies and censors have been instructed that cablegrams relating to the supply of foodstuffs to Germany under the terms of the Brussels Agreement, may now be accepted for all destinations in Germany when such messages are otherwise unobjectionable.

## RADIO TELEGRAPHY.

### Marconi Notes.

THE MARCONI COMPANY has leased quarters for its New York main office at 68 Broad Street, now occupied by the Central and South American Cable Company, which company is about to occupy its new building now approaching completion. The Marconi Company will vacate its present office when the new quarters are rearranged and renovated.

HARRY CHADWICK has been appointed superintendent of the New York main office.

J. C. MACBETH, managing director of the Marconi International Code Company, Ltd., of London, arrived in New York recently on the steamer *Olympic*.

### Independent Wireless Telegraph Company Notes.

CHARLES J. PANNILL, vice-president and general manager, has returned from a business trip to Washington and Philadelphia.

CHARLES HAHNES, formerly of the Tropical Radio Company and recently in naval service, has joined the technical staff of this company.

GEORGE N. ROBINSON is in Boston in connection with the business of the company.

THE COMPANY'S business is rapidly growing to large proportions. The number of ships in New York equipped with the company's apparatus has passed the hundred mark.

FRANK A. HART, formerly in the service of the navy, has been appointed superintendent of construction for the Independent company, with offices at No. 99 Pine Street, New York.

JOHN GREGG has joined the construction forces of this company.

CHARLES J. PANNILL has been elected vice-president and director of the Liberty Electric Corporation, of Portchester, N. Y. This company is engaged in the manufacture of general electricial apparatus in addition to radio apparatus.

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THE PAN AMERICAN WIRELESS TELEGRAPH COMPANY has been granted a concession in Cuba for the establishment of an international radio telegraph service between Cuba, the United States, and other countries; the company to erect a number of receiving and transmitting stations in Cuba.

IN CANADA the pre-war regulations covering radio telegraph amateurs have been resumed. An order in council has been passed authorizing a fee of five dollars for emergency certificates.

THE MARCONI WIRELESS TELEGRAPH COMPANY OF CANADA is conducting experiments in long distance radio reception at a station in Montreal. The possible erection of a long distance transmitting station depends upon the success of the present experiments.

### Condensers With Mica Insulation.

The wide use of wireless telegraphy has given a great impetus to the production of high-grade mica. Prior to 1915 most radio sets were equipped with Leyden jar condensers, but subsequently mica condensers have largely replaced them. Mica condensers consist of 1000 or more sheets of mica alternating with sheets of foil, the whole being inclosed in an aluminum case. They have the advantages of low power loss, small volume and durability.

As a result of the imperative demand for radio sets for military purposes, about 50,000,000 sheets of mica were used during one year of the war. With the return of peace the wide application of wireless telegraphy to commercial uses will undoubtedly command a strong and steady market for condenser mica.

Condenser mica must be of the highest quality. It must be free of iron compounds, air bubbles, pin holes, cracks or other defects or impurities that impair its dielectric strength. In this connection it is of interest to mica producers that for the most exacting demands in condenser manufacture high-grade domestic muscovite compares favorably with India or other foreign mica. It is claimed, however, that as a rule the domestic product is less carefully trimmed and graded than the imported material and is on this account less in demand. With the assurance that domestic mica possesses essentially the same inherent qualities as foreign mica for this new and important use, it is to be regretted that the method of treatment places it on an unfavorable commercial basis.

The Bureau of Mines offers the suggestion, therefore, that mica miners and manufacturers give careful study to the question of trimming, grading and classification, and make every effort to prepare their products in forms favored by users of manufactured mica.

## OLD-TIME TELEGRAPHERS' AND HISTORICAL ASSOCIATION AND THE SOCIETY OF THE UNITED STATES MILITARY TELEGRAPH CORPS.

The annual reunion of the Old-Time Telegraphers' and Historical Association, and of the Society of the United States Military Telegraph Corps will take place at the Hotel Winton, Cleveland, Ohio, on September 10, 11 and 12. The members of these associations who contemplate taking a vacation this year should arrange their schedule so as to include a trip to Cleveland. The local committees are in full working order and are preparing a program of entertainment that will make this year's reunion in every sense of the word a peace celebration. It is only necessary to name the chairmen of the various local committees to convince those who contemplate a visit to Cleveland that their interests will be well taken care of. Mr. W. H. Canniff is president of the association; vice-presidents, T. W. Hill, B. J. Ross and F. W. Sprong; General Committee, W. R. Woodford, Rockefeller Building; Committee on Finance, T. W. Hill, Guardian Savings and Trust Company, S. C. D. Johns, treasurer, the Illuminating Company; Committee on Entertainment, W. R. Woodford; Committee on Hotels, B. J. Ross, Western Union Telegraph Company; Committee on Registration, I. Morris, 732 *Leader-News* Building; Committee on Press and Printing, B. J. Ross; Committee on Badges, H. E. Patton, manager, Postal Telegraph-Cable Company; Reception Committee, W. H. Canniff; Ladies' Reception Committee, Mrs. W. H. Canniff.

Members should be prompt in notifying the chairman of the Hotel Committee what their intentions are in regard to hotel reservations. The printed notices of the meeting are now being mailed to the membership at large, and non-members desiring copies may obtain the same of John B. Taltavall, Secretary, 253 Broadway, New York.

### Electrical Instrument Making for Amateurs.

The above is the title of a book by S. R. Bottone, now in its eighth edition, which was written for the amateur experimenter who desires to learn electrical engineering principles by making electrical devices with his own hands. There are 272 pages and ninety-six illustrations, and detailed descriptions are given of how to make condensers, Leyden jars, induction coils, electroscopes, Tesla coils, magneto armatures, thermopiles, elementary wireless telegraph apparatus and many other pieces of electrical apparatus. The instructions are so simple that only inexpensive tools are required in making the instruments described.

The book sells for $1.35, and copies may be purchased from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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## THE END OF GOVERNMENT CONTROL OF THE WIRES.

Both houses of congress have decreed the return of the telegraph and telephone wires to their owners, and all that remains is for them to get together on some details in conference.

The House on June 19 passed the Senate bill which restores the wires and repeals the law under which they were taken over by the government. Instead of immediate return, however, the House provided restoration at the end of the calendar month in which the bill is signed by the President. Instead of continuance for ninety days of the new rates made under the Burleson régime, the House provided that they should be continued "for a reasonable period, not exceeding six months."

The important sundry civil bill was set aside by the House to give the wire bill the right of way. Since the House bill sets the last day of the month during which the bill is approved as the date for the return of the wires, it was feared that unless immediate action was had the bill could not be sent to Paris and signed by the President in time for the return of the wires on June 30.

Representative Martin Madden, of Illinois, charged during the debate that the wires never would have been taken over had it not been for the conviction on the part of the security holders of the companies that they would be kept permanently by the government.

"They wanted to exchange their securities for government securities on which they could draw interest for the rest of their lives and then turn over to their estates," he said.

"The reason the wires were taken over," Representative Moon, of Tennessee, contradicted, "was because all foreign news was leaking before it got to the President and the cabinet."

"That might have been the reason for taking over the cables, but not the wires," Madden replied.

"Yes, and the wires," Representative Moon concluded.

Mr. Madden said one year of federal operation of the wire systems had cost the government $40,000,000. He said he wanted it plainly stated in the law what bodies were to do the regulating of the wire systems in the future.

"I want nothing ambiguous about this law," he said. "I want the Postmaster General's rates to stay in effect only until they can be revised by the proper state and municipal authorities."

The formal report of the House Interstate Commerce Committee on the wire return bill anticipates the situation that will exist at the time the Postmaster General's rates are abolished.

The report says in connection with rate fixing: "As the President has advised Congress that he would turn back the railroads at the end of the present year, it is hoped that in the proposed railroad legislation provision can be made to give to the Interstate Commerce Commission more complete regulatory power over wire systems doing an interstate business, so when the six months period provided for in the amendments to this act expire the commission will have authority to act upon rate and other matters without leaving what might otherwise be an embarrassing and confusing interval."

The report explains that by having the act go in effect at the end of the month on which the President signs the bill, rather than on the exact date of his approval, accounting by various companies returned will be much simplified and unnecessary expense avoided.

The report explains why the present rates are extended for six months instead of the ninety-day period provided in the Senate bill.

"Your committee believed that the period of ninety days, contained in the Senate act, too short to permit the commission or regulatory body to pass on the hundreds of applications which would be filed in view of the differing requirements and conditions in the several States, as in Ohio, where before an application can be passed upon valuation must be made, or in Michigan, where the municipality must join with the company in making the application."

In explaining the extension from sixty days to ninety days for the time required for the President to make his report on government control of wire communication the report said that sixty days would be insufficient.

### The Telegraphers' Strike.

The strike of the members of the Commercial Telegraphers' Union of America is still in force against the Postal Telegraph-Cable Company and the Western Union Telegraph Company.

So far as we have been able to learn, the strike is being conducted without the commission of overt acts of violence on the part of the men who left their positions in response to the call for a strike.

It is not apparent that the existence of the strike has caused serious inconvenience to the telegraph companies or delay to traffic.

The Postal Telegraph-Cable Company set a date when the men on strike from its service might return and resume their seniority rights, and some of the older employees took advantage of this offer.

In the service of the Western Union Company the organization of the Association of Western Union Employees had, before the strike was called, advanced to a stage where the company's organized employees, or the majority of them, felt that they would be able to secure from the company all of the concessions desired at this time without resorting to the strike weapon.

The Amercan Federation of Labor convention, on June 24, took a step toward a settlement of the strike. A committee was appointed to visit Postmaster General Burleson and ask him to extend to the telegraphers the order he issued directing telephone companies to meet their employees to settle differences. The convention adopted measures giving the strikers the moral support of the Federation and commending their efforts to obtain recognition of their union.

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## AMERICAN TELEPHONE AND TELEGRAPH COMPANY.

OFFICIAL CHANGES.

Important changes in the personnel of the American Telephone and Telegraph Company, and a reorganization of the corporation, were announced by Theodore N. Vail, chairman of the Board of Directors. Mr. Vail's statement on the matter follows:

"Preparatory to the end of the period of Federal control, and in view of the great development which has taken place in the art of transmission of intelligence by electricity, particularly of the great development of multiplex telephony, machine operation of both telephone and telegraph, and of wireless telephony, there are many large problems confronting the American Telephone and Telegraph Company, all in the line of greater, better development and wider usefulness.

"In view of all this and to facilitate all the possibilities of the future, it is necessary that the organization be adjusted to meet these new problems and be put on a permanent basis.

"I have requested of and recommended to the Board of Directors the following changes, which are in titles rather than in functions.

"I will, as the Chairman of the board, be in active direction of the policy and problems of the company, and by this change will be enabled to give more of my uninterrupted time and attention to the larger problems of the business.

"Vice-President Union N. Bethell, who has been in charge of the Federal Operating Board, was invited to join the organization, but as he wishes to take a long rest, has declined, to the regret of the board. H. B. Thayer, who has been for nearly forty years prominently identified with the operating of the telephone system, both from the manufacturing standpoint and from the practical operation, has been made president. N. C. Kingsbury, who has had to do with both the operating and public relations, has been made first vice-president. N. T. Guernsey, the general counsel, has been made vice-president in charge of the legal department. John J. Carty, long the head of research, experiment and development, has been made vice-president in charge of development and research. W. S. Gifford, who has long been connected with the company, and who, since resigning as Director of the Council of National Defense, has been comptroller of the company, has been made vice-president in charge of accounts and finance.

"Bancroft Gherardi, for many years Mr. Carty's chief aid, and who has been acting chief engineer during the period of Mr. Carty's war service, has been made chief engineer."

### Bell Telephone Company of Canada.

The capital stock of the company has been increased from $18,000,000 to $22,500,000. Present stockholders have the right to subscribe for one new share of $100 for every four shares now held.

## CANADIAN NOTES.

CHARLES R. HOSMER, a director of the Canadian Pacific Railway Company, and who has been in Royal Victoria hospital, Montreal, during the past three months, is improving in health gradually and is able now to take automobile trips for short distances.

B. S. JENKINS, formerly general superintendent, Canadian Pacific Railway Company's Telegraphs, at Winnipeg, Man., has returned from California and British Columbia where he spent the past winter, and has resumed his farming operations in the Lake Manitoba district.

W. H. DOYLE has been appointed acting local manager of the Western Union Telegraph Company at Moncton, N. B.

R. F. ERRINGTON has been appointed local manager of the Great North Western Telegraph Company's office at Regina, Sask.

THE DOMINION GOVERNMENT, it is stated, is planning upon abandoning the government operation of its telegraph lines. The proposal is to merge the government's eastern lines with those of the Great North Western Telegraph Company, and the government's western lines with those of the Grand Trunk Pacific Telegraph Company.

IT IS REPORTED from Ottawa that several long range radio telegraph stations are to be installed in the Yukon territory by the Canadian government.

H. HULATT, manager, Grand Trunk and Grand Trunk Pacific Telegraphs, and A. P. Linnell, supersisor of traffic, Montreal, attended the convention of the railroad telegraph and telephone superintendents held in Chicago, June 11-13.

### Great North Western Telegraph Conference.

On June 12, the annual conference of the commercial department, Great North Western Telegraph Company was held in Toronto, district officials being present from all parts of the system.

An interesting feature of one of the sessions was the presentation to General Manager George D. Perry, of a magnificent cabinet of silver in recognition of his recent marriage, and as a testimony of the esteem in which he is held by the officials and employees of the Great North Western Telegraph Company. The presentation was made by W. G. Barber, district superintendent, Toronto.

D. E. WISEMAN, equipment engineer, Pacific Telephone and Telegraph Company, San Francisco, Cal., is in New York for a few months, located at No. 5 Dey Street.

IN THE JULY 16 issue of TELEGRAPH AND TELEPHONE AGE we will have a complete illustrated article describing the Western Union Telegraph Company's new Universal duplex system, showing main and local circuits.

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# RAILROAD TELEGRAPH SUPERINTENDENTS ANNUAL MEETING HELD IN CHICAGO, JUNE 11, 12 AND 13.

At a meeting of the Association of Railway Telegraph Superintendents, held in Chicago, June 10, a resolution was adopted disbanding the Association. On June 11, at the opening session of the Telegraph and Telephone Division of the American Railroad Association, President M. H. Clapp in his address to the members stated that at present the railroad telegraph superintendents are working, as an organization: first, under the articles of organization and by-laws of the American Railroad Association; second, under the rules of order of Section 1, Operation, of the American Railroad Association; and, third, under regulations which may be made by the Telegraph and Telephone Division.

After outlining in some detail the steps which led up to amalgamation with the American Railroad Association, President Clapp presented some of his ideas relative to the future activities of the newly formed organization. He said:

"We should continue in the work of perfecting our present organization with a view to making it stronger and more vigorous. This object can be attained by the members giving more attention to the work of the division and also by increasing the number of members of the division. Also, we should have as soon as practicable a secretary with telegraph experience assigned to our work.

"At every opportunity we should, in general, call attention to the increasing importance of telegraph departments on railroads. The point should be emphasized that there have been important changes during the past fifteen years in the character of the wire facilities used by railroads. We have changed from almost exclusive use of the telegraph in handling railroad business to an extensive use of the telephone. Telephone circuits and apparatus are much more complicated to handle than telegraph circuits and apparatus. Our standards of maintenance, operation, and efficiency in general have been improved. Accounting methods have become more exacting. During the past few years telegraph printers have come into use on the railroads. More attention is being paid to censoring and the use of codes than formerly.

GEORGE D. HOOD,
Superintendent of Telegraph,
Chicago, Rock Island and Pacific Railroad.

H. C. CHACE,
Superintendent of Telegraph,
Atchison, Topeka and Santa Fe Railroad.

"Further, I predict that a great many additional changes and improvements especially in connection with telephony will be made within the next few years. Having these points in mind I think it is obvious that more supervision, stronger organizations and more proficient personnel than was formerly necessary is required in handling under present conditions the telegraph and telephone facilities of the railroads. We certainly should at every opportunity call attention to the facts that I have stated, and endeavor to put our telegraph departments on a higher plane.

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"We should realize that we are at the beginning of an era of co-operation. Co-operation is, I believe, the spirit of the age in which we live. In the work of our division we should co-operate with one another, with the departments and with the divisions with which we are associated and those engaged in similar lines of work as our own. We should also co-operate with companies other than the railroads which are engaged in similar lines of work. It is particularly desirable for us to co-operate with the commercial telegraph companies with which railroads in this country are so closely allied. We should get it into our minds that we are a part of a large railroad organization, and also a part of a large business. We should get it out of our minds that we are an entity unto ourselves, and we should not attempt to proceed in our work alone without taking into consideration the other interests with which we are associated.

"Now, in order to achieve a reasonable number of the ambitions which I have enumerated it will be necessary for us to do a considerable amount of common, every-day, hard work for our division, aside from our regular work. It will be necessary for us to take our committee assignments seriously and attend the meetings and work of the committees.

"Further, we should appreciate that we are at the beginning of a new era. The great war is over and we are now considering more or less the problems of reconstruction. The men who temporarily left us to serve in the army and navy are returning. We are trying to get back to a peace basis as rapidly as practicable. The main point to have in mind, however, in connection with the present situation is that we are never going back to the old basis. We are going to be on a new basis. The questions which we are accustomed to handle in connection with our work have assumed or are assuming new relations, and in order to make a success of our work it will be necessary for us to study and become familiar with all these new relations. If we have these points in mind I believe that we shall be able to take full advantage of the great opportunity before us."

S. L. VAN AKIN, Jr.,
Asst. Superintendent of Telegraph,
New York Central Railroad.

C. A. PARKER,
Superintendent of Telegraph,
Denver and Salt Lake Railroad.

OUTSIDE PLANT.

The report of sub-committee A, of Committee No. 1, Maintenance and Construction of Pole Lines, was presented by Chairman G. A. Cellar. The specifications for the construction of pole lines, although presented as a preliminary draft, or progress report, were very complete in detail, embodied in an eighty page pamphlet.

The discussion on these specifications was very thorough and was participated in by Messrs. R. E. Chetwood, E. C. Keenan, H. Hulatt, E. A. Chenery, J. F. Caskey, William Bennett, and C. S. Rhoads.

The report of sub-committee B, Committee No. 1, having in hand the subject of Wire Crossings, was presented by E. C. Keenan, chairman. The report was discussed by several active and affiliated members, including H. Hulatt, J. F. Caskey, William Bennett, C. S. Rhoads, M. G. Lloyd, P. J. Howe, H. W. Drake, and K. L. Wilkinson. In the main, the discussion hinged around the interpretation to be placed upon the words "important railway lines." In some quarters it was considered that the type of construction does not necessarily have to be the same where signal lines cross over railroad lines which are unimportant from a railway traffic standpoint, as should be required over main or trunk railroads. The discussion was closed by a motion by E. C. Keenan which provides that the standards of construction shall be practically the same for overhead wire crossings regardless of the importance of the railroad line.

UNDERGROUND CONSTRUCTION.

The report of sub-committee C of Committee No. 1, dealing with Underground Construction, was

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read by L. S. Wells, chairman. Discussion was by Stanley Rhoads, K. L. Wilkinson, J. J. Ross, and E. C. Keenan.

TRANSPOSITIONS.

The report of sub-committee D of Committee No. 1, on the subject of Transpositions, was read by R. E. Chetwood, chairman. Discussion was by L. S. Wells, Worth Rogers, and I. C. Forshee.

INSIDE PLANT.

The report of Committee No. 2, Construction and Maintenance of Inside Plant, was read by R. F. Finley, chairman. The specifications presented cover the installation of telegraph and telephone equipment in railroad offices.

ELECTROLYSIS.

Committee No. 3, through chairman William Bennett, presented its report on Protection Against Electrolysis.

J. B. NORCROSS,
Superintendent of Telegraph,
Maine Central Railroad.

PROTECTION.

The report of Committee No. 4, Protection Against Lightning or Electric Light and Power Circuits, was presented by J. F. Caskey, chairman. Discusssion was by J. H. Brennan, Stanley Rhoads and H. W. Drake.

TELEGRAPH AND TELEPHONE DEVELOPMENT.

Committee No. 5, Telegraph and Telephone Development, presented its report through J. A. Jones, chairman. The report follows:

TELEGRAPH OPERATION.

There has been practically no new development in telegraph operation during the past two years. Progress has consisted mostly in the further application of automatic apparatus, particularly multiplex printing telegraph apparatus. As indicating the extension of the use of automatic apparatus, on December 31, 1918, there were in the Western Union Telegraph Company's service, 210 Multiplex printing telegraph circuits operating on approximately 121,500 miles of wire. In addition there were on that date in operation eighty-eight Morkrum printing telegraph circuits on approximately 33,800 miles of wire. Practically 50 per cent of the total telegraph messages moving over the Western Union wires are now being handled by automatic operation.

TELEGRAPH APPARATUS.

*A. Alternating Current Sounder.*—Considerable improvement has been made during the past year in a type of alternating current sounder which the Western Union Telegraph Company has been experimenting with. It now seems quite likely that this sounder can shortly be placed in service. The principle involvd in the sounder has also been satisfactorily applied to messenger call circuit units and to certain types of ticker service.

*B. Universal Duplex Repeater.*—Because of the many duplex repeaters formerly in use and the confusion resulting therefrom, it has been found necessary to develop and standardize a universal duplex repeater. This repeater, as its name indicates, provides for all classes of polar duplex repetition likely to be required in telegraph service.

J. L. HENRITZY,
Superintendent of Telegraph,
Colorado and Southern Railroad.

INDUCTION.

*A. Anti-Noise Sets.*—An anti-noise set has been developed and tried out experimentally, which practically eliminates disturbances induced in telephone circuits from automatic printing telegraph circuits, provided that the telephone circuits are in good condition as regards balance and transposition. A more extended use of these anti-noise sets can be made in the future if it is found that telephone circuits are being seriously affected with induction from automatic telegraph circuits.

*B. Anti-Induction Equipment.*—A type of cable having shielded conductors was developed some

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years ago to reduce the induction between telegraph circuits carried in the same underground or aerial cable. This cable with shielded conductors was expensive to manufacture and install, furthermore it was not quite as flexible as could be desired in connection with the changing of circuit assignments. Considerable experimental and development work has been done to develop anti-induction equipment which could be installed in the main telegraph office and which would reduce appreciably induction between telegraph circuits where such circuits are operated duplex. The experimental and research work has resulted in the development of anti-induction equipment which reduces the induction to a considerable extent, and which will make it necessary in the future to install shielded conductor cables.

*California Railroad Commission General Order No. 52.*—During the year there was issued by the California Railroad Commission the final report of the Joint Committee of Engineers authorized by the commission to conduct an investigation of inductive interference. This joint committee represented power companies, telephone and telegraph companies, railroad companies and the Railroad Commission of California. This commission has jurisdiction over all public utilities within the state. The

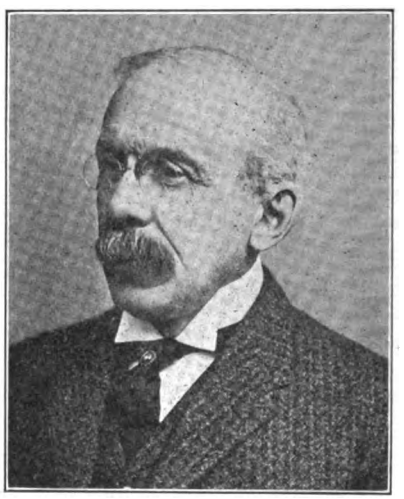
J. M. WALKER,
Superintendent of Telegraph,
Denver and Rio Grande Railroad.

joint committee studied for about five years both experimentally and theoretically the causes of inductive interference from high tension power lines and the proper remedial measures for such induction. Its unanimous report was based not only on this technical information, but also upon the economic aspects of the problem and the consideration of the interest of the public in efficient power and communication service.

Included in the committee's report are recommendations for rules governing the construction and operation of power and communication lines for the prevention or mitigation of inductive interference. These rules have been made effective in California by the Commission's General Order No. 52.

Both power and communication interests generally are agreed that this report represents a marked step in advance, and constitutes the best treatment of the subject available to date. It illustrates the importance of the engineers of the various power and communcation interests working in closest co-operation in the solution of the difficult problems of interference.

It has been appreciated for some time that practically all of the noise interference in telephone circuits from power circuits is caused not at all by the fundamental power frequencies, but by the harmonics in the power waves. There has not been, however, any simple means of determining the relative effect of different power wave shapes in causing such interference. To care for this, the Standards Committee of the American Institute of Electrical Engineers has adopted some new rules relating to what is known as "telephone interference factor." The telephone interference factor of a power wave is a figure which gives the comparative interference caused by the power wave in paralleling telephone circuits. The rules also describe a simple



M. MAGIFF,
Superintendent of Telegraph,
Central Vermont Railroad.

apparatus for determining this factor for any given power wave.

### OCEAN CABLE OPERATION.

By the extended use of magnifiers, the message capacity of ocean cables has been greatly increased. Magnifiers of the Huertley, and Dixon selenium cell types, and high speed cable relays of the Brown, Bruce and other types have been used with great success during the past two years in ocean cable operation.

Considerable research and development work has been done in connection with the application of automatic printing telegraph apparatus to ocean

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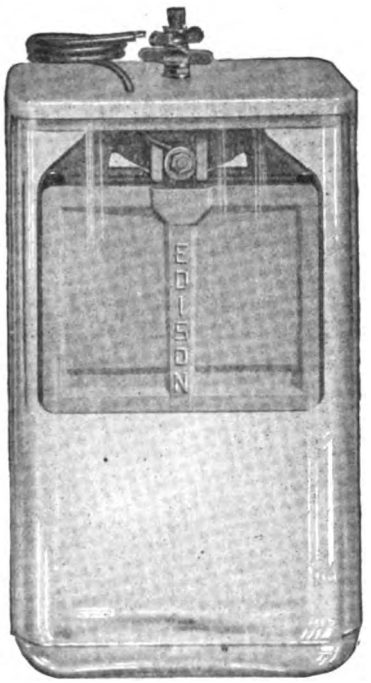
# FOR CLEAR TRANSMISSION




EDISON PRIMARY BATTERY DIVISION

THOS. A. EDISON, INC.

BLOOMFIELD, N. J.

# HALL SWITCH & SIGNAL CO.

**GARWOOD, N. J.** **CHICAGO**

*MANUFACTURERS OF THE*

## *GILL SELECTOR*

**THE UNIVERSAL SELECTOR FOR TELEGRAPH AND TELEPHONE**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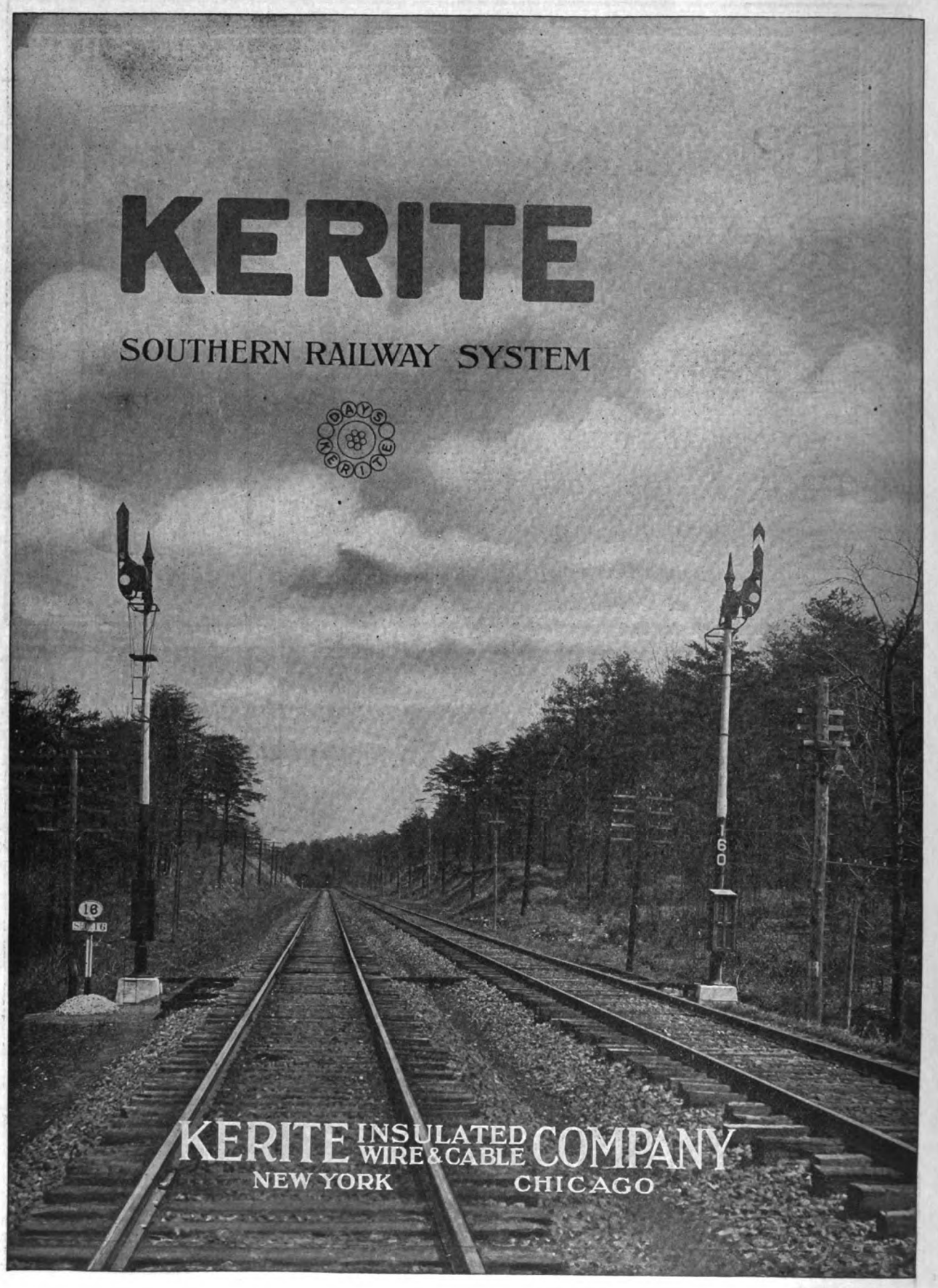


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cables, with the result that satisfactory automatic operation over an ocean cable between Heart's Content, N. F., and Valentia, Ireland, has been accomplished. This represents the first time that automatic printing telegraph apparatus has been successfully used on a long ocean cable.

### MULTIPLEX TELEPHONY.

A multiplex telephone system was put into commercial use during the year by the American Telephone and Telegraph Company between Baltimore and Pittsburg. This system gives four circuits over a single pair of wires in addition to the ordinary telephone circuit over the same pair. This multiplexing makes use of "carrier currents," each telephone channel being operated at a different carrier frequency.

The vacuum tube plays a very important part in this system. The transmission of the carrier frequencies over telephone circuits and the separation of the different frequency ranges from each other at the terminals has required a very large amount of development work. The system promises to have a considerable field in long distance telephone service.

### VISUAL AND PHOTOGRAPHIC RECEIVING OF WIRELESS MESSAGES.

C. A. Hoxie, engineer, General Electric Company, is the inventor of a device whereby wireless messages are visualized and also photographed, and with the aid of this invention, the eye may be used to supplement or entirely replace the ear in reading wireless messages.

The visual and photographic recorder is an instrument designed to photographically record radio signals on a specially sensitized paper tape nineteen millimeters wide. The signals are recorded by means of a beam of light being reflected from a small mirror attached to a galvanometer of special design. This galvanometer is placed in parallel with the telephone receivers of an ordinary wireless receiving set, a portion of the energy of the incoming signal being used to operate the galvanometer.

By this means the mirror is made to vibrate very rapidly whenever a dot or dash is impressed upon the circuit. The source of light comprises two incandescent lamps of special design, the reflection from one being used to make the record on the sensitized tape, the light from the other being projected on a small ground glass screen thus making the vibrations visible which enables the operator to properly adjust the machine and also to read the message if the rate of sending is not too rapid.

The paper by means of a system of pulleys, gears and a small motor is made to slowly pass the point of exposure, thence successively through the developer, fixing bath, washing and drying tubes to a basket at the end of the machine. The elapsed time between the time of exposure and its delivery into the basket being about two minutes. The projection of the tape into and from the developing, fixing, washing and drying tubes is entirely automatic, this being accomplished by a system of relays operated by a small storage battery.

Due to the selectivity of the instruments, signals can be recorded through strong interference. This characteristic enables this machine to successfully record under conditions met with in practice, in fact, regular daily traffic is now being recorded between France and the Naval Radio Station at Otter Cliffs, Bar Harbor, Me.

The type of machine now used by the government and those now under construction are capable of recording at a speed of 1,250 letters or 250 words per minute, although the speed at which they can be transmitted at the present time is considerably less than this. The recording speed of the machine above referred to is limited by the mechanical feed and development of the tape. The galvanometer is capable of recording at speeds much higher than this.

C. S. RHOADS,
Superintendent of Telegraph,
C. C. C. and St. L. Railroad.

### TELEGRAPHIC AND TELEPHONIC WIRELESS.

Doubtless it may be said that two of the chief factors in the great advancement of wireless communication since 1914 are the continuous wave system and the thermionic or French valve, for the experimenting and perfecting of which much credit must be given to our Signal Corps in France and Flanders.

The valve can be used as an amplifier, relay, oscillation producer, rectifier, in fact, there would seem to be no end to the uses it will ultimately be put to. One valve circuit amplifies six times; two, thirty-six times; three, 216 times, and so on. The Australian station has used fifteen valves, receiving

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from Carnavon, Wales. This number of valves on a short distance sounds like a steam whistle and, as a signaler remarked, with any more you would certainly hear the angels singing.

Successful reception of the voice is now obtainable between the same points with three valves.

The continuous wave system is now a success in trans-Atlantic wireless telegraphy. The old original spark system is being discarded in its favor, a great saving in power being effected thereby. It may be assumed with confidence that the problem of providing a suitable sensitive receiving device is solved. The cascade and regenerative arrangements of the all important thermionic valve which has rendered possible radio-telegraphic communication for distances of 6,000 miles and over are equally suitable for telephonic reception of speech. It would seem reasonable to suppose in the near future continuous wave wireless and the valve will be operated as an adjunct to our present railroad and commercial telegraph and telephone systems.

Earth conduction wireless telegraphy has been used to a considerable extent in the war zone for distances up to three or four miles, distance being regulated by battery strength. A buzzer, telegraph key, amplifier, induction coil, two iron pins to plug in on the earth with a piece of well insulated copper wire stretched between the pins comprises this inexpensive outfit. The weakest wave reaching the distant station is sufficient to operate when the valve is on the job. Telegraph signals and telephone conversation passing along wires may be read and heard on this apparatus placed one mile and a half from the pole line.

### WIRELESS TELEPHONY.

The American Telephone and Telegraph Company report that practically all recent development in wireless telephony involves the use of the audion, either as generator, modulator, amplifier or detector of radio signals. More advance has been made in receiving than in transmitting features, some of the most interesting developments being improved methods of static reduction, the loop receiver and highly selective directional receivers, all of which have been made possible by the audion amplifier.

During the past year, wireless telephony has been successfully applied by the navy to communication between vessels in close formation—also to communication within a fleet of submarine chasers. The wireless telephone has also been successfully used by aircraft for communication within a formation and with ground stations.

### SIMPLEX LOCAL MORSE AND SELECTOR TELEPHONE CIRCUIT.

Due to the action of the salt and spray arising from the Great Salt Lake in Utah, across which the Southern Pacific Railroad operates, both the construction and maintenance of telegraph and telephone circuits are very difficult. These adverse conditions created the necessity which forced the Telegraph and Telephone Department of the Southern Pacific to evolve something unique, if not entirely new, in the way of a combination local Morse and telephone selector circuit.

The Salt Lake district is 120 miles long and thirty-five miles wide, and to construct circuits across it, it was necessary to drive piling of sufficient height and distance from the trestle to maintain wires above and away from the spray. There were two wires along this 120 mile section—one a No. 9 B & S copper, the second wire consisting of fifty miles of copper and seventy miles No. 8 galvanized iron. This pair of wires was simplexed and AC type telephone selectors installed at eight local stations. Morse instruments were likewise installed at the eight intermediate stations. Repeating coils were placed at each intermediate station with a 5-AC repeating coil having 1,000 ohms resistance on each side of the simplex bridge at the terminal of the circuit, which is 120 miles from Ogden, Utah. At Ogden, there were placed forty condensers, bridged with 800 ohms resistance in series with the line which connects with a selector apparatus case. Equipment arranged in this way prevents current drain on battery during long impulses. The 800 ohm bridge around condensers lengthens impulses and prevents distant selector dropping off between steps. To cause the selector to properly release during long impulses, it is necessary that the condenser should be removed or short-circuited in the selector set and the station selector set should be connected across the secondary of the repeating coil.

The circuit operates on a minimum of 200 volts. A repeating coil, specially designed, is installed at each intermediate station.

In addition to the eight intermediate telegraph and telephone stations, there are nine intermediate telephones installed at blind sidings for the use of trainmen.

This circuit has operated with entire satisfaction for a period of a year.

### A COMBINATION SELECTIVE TELEPHONE AND QUAD CIRCUIT

The Southern Pacific has a simplex telephone circuit, Los Angeles to Indio, a distance of 130 miles with twenty-one intermediate telephone selector stations. One of the wires comprising this pair is used as a quadruplex circuit, Los Angeles to El Paso, polar side being 810 miles in length. The common side operates between Los Angeles and Tucson, a distance of 502 miles, without repeaters, the "Goslin" type of quad being used on this circuit. As is known, the "Goslin" quad is wired in multiple, which cuts out the 800 ohm resistance in the neutral relay at both terminals.

Both telephone and quadruplex Morse operation from this circuit is reported to be highly satisfactory.

### AUTOMATIC SIGNAL STORAGE BATTERY OPERATES MORSE SOUNDERS.

The New York Central is utilizing automatic station main storage battery to operate telegraph sounders in all stations Buffalo east, where the storage battery is available. Very satisfactory results reported to be had from this arrangement.

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### AUDIBLE ALARM FOR RECTIFIERS

The New York Central has a rectifier in a room separated two doors from the telegraph office at Utica. Due to different causes, the mercury arc is at times put out of commission and in order that telegraphers in the telegraph office might know when this occurred, an audible alarm of sufficient sound was installed in the telegraph office which operates when the rectifier fails.

The alarm consists of a bridge across the output wires of a small one-ohm relay in series with 650 ohms resistance. The relay is held closed until period of no current, at which time the armature falls back and closes local circuit which operates a bell in the telegraph office.

It is thought the audible alarm arrangement is susceptible of considerable further development by the use of a repeating sounder having perhaps three or four turns of No. 12 wire on each magnet, sounder to be placed in series with one of the output wires.

### A NEW JACK BOX AND SIGNAL

A new six-line jack box and signal, suitable for either magneto, ringdown or d. c. selector operation, has been placed on the market.

### SIMPLEX BLOCK TELEPHONE CIRCUIT

The New York Central reports operating a station to station simplex block telephone circuit a distance of 272 miles, voltage at terminals 160 and 200, respectively. The telegraph circuit derived from this simplex has sixty 150-ohm relays and eighty-eight No. 47-A repeating coils in it.

Notwithstanding the large number of repeating coils, this long telegraph circuit operates satisfactorily without increased voltage at either terminal or the installation of intermediate battery or repeaters.

### DUPLEX WIRELESS TELEPHONY

Mr. E. F. W. Alexanderson, consulting engineer of the General Electric Company, has perfected wireless telephony to the extent it will be possible to converse practically any distance. Satisfactory tests have already been made a distance of 3,200 miles.

One of the outstanding features of the system is the "Barrage Receiver." This was found necessary in order to neutralize the overwhelming intensity of the transmitted signal so as to make the receiving set sensitive to the faint impulses of the distant signal. The barrage receiver is fundamentally a uni-directional receiver. The principle followed by the inventor was:

1. That the antennas should be aperiodic, because the balance of two tuned circuits is fundamentally very delicate and difficult to adjust for a perfect balance.

2. That the balancing should consist in neutralizing the electromotive forces in the aperiodic antennas before those electromotive forces have had a chance to create oscillating currents. The phase shifting device should therefore be aperiodic.

3. The two or more antennas should be of the same character; in other words, it is preferable to balance a magnetic exposure against another magnetic exposure rather than against an electrostatic exposure.

Other features of the system are:

(a) *High Frequency Alternator.* This is rated at 200 K. W. and the whole machine weighs about twelve tons without its base. Has a solid wheel which weighs nearly three tons and rotates 2,100 revolutions per minute. Machine has a frequency of 22,000 cycles per second.

(b) *Multiple Tuned Antennae*: If two sets of wires are mounted on the same masts, the radiation from one set to the other is obviously so strong that the overpowering of an ordinary receiving set by the transmitted energy would be almost of the same order of magnitude as if the identical wires were used. Two methods of neutralization have been used: inductive and static (capacitive) neutralization. The capacitive neutralization is preferable on account of accuracy of adjustment and simplicity.

### SELECTORS OPERATED BY CHEMICAL RECTIFIERS

Chemical rectifiers are in limited use by a few railroads to provide current for selector ringing where 60-cycle current is available and where the voltage required is not greater than 150. Within this limit, fair satisfaction is said to have been obtained.

It is claimed the rectifier from which best results have thus far been secured is the McIntosh, costing about $35.00. The majority, however, of rectifiers now in use are constructed by the roads using them and consist of four salamoniac type battery jars with an iron plate as negative and an aluminum plate as positive. This outfit, including necessary coils, switches, transformers, etc., costs approximately $30.00. Renewals are required about every six months and cost $2.50.

A comparison of the cost of operating a circuit with a chemical rectifier as against dry cells was decidedly in favor of the former.

This investigation also indicated motor generators to be more efficient and economical than dry cells, the rectifier being a satisfactory and economical substitute for both motor generators and dry cells for circuits requiring only low voltage for operation.

Some roads who have their own d. c. current for lighting or power, use this current for selector ringing, adding a sufficient number of dry cells to bring the current up to desired voltage.

COMPARATIVE STATEMENT SHOWING MILES OF RAILROAD OPERATED BY TELEGRAPH AND BY TELEPHONE

| Date | Total Miles Road | Telegraph Miles of Road | Telephone Miles of Road | Percent of Miles of Road Operated by | |
|---|---|---|---|---|---|
| | | | | Telegraph | Telephone |
| Jan. 1, 1918 | 244,356 | 142,119 | 110,404 | 58.2 | 45.2 |
| Jan. 1, 1919 | 244,134 | 136,584 | 113,440 | 55.9 | 46.4 |
| | *222 | *5,535 | **3,036 | | |

* Decrease. ** Increase.

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From the above, it will be noted that there was a decrease of 5,535 miles in the length of railroad line on which the telegraph was used for the transmission of train orders and an increase of 3,036 miles in the length of railroad line on which the telephone was used for the transmission of train orders.

### FEDERAL MANAGER SPEAKS

During the afternoon session on June 12, the meeting was addressed by R. H. Aishton, federal manager of the Northwestern Region, United States Railroad Administration. In his remarks Mr. Aishton stated that he had always attached high value to the craft affiliations of the members of the telegraph staff—that he regarded a certificate of membership in the Old Time Telegraphers' Association hanging upon an office wall as a badge of honor. Mr. Aishton related how when he was a telegraph messenger boy he swept out a railroad depot and cleaned the lamps over a protracted period for the privilege of securing a coil of old telegraph wire which for long had reposed underneath the station platform. The wire was used to string a practice telegraph line between his home and the home of a boy friend who lived a half mile away.

Mr. Aishton dwelt at some length upon the present railroad situation, with a view to impressing upon the assembled telegraph superintendents the fact that new ideas and new methods will shortly prevail and that should the railroads be returned to their owners in the near future those who will operate the roads must realize that there will be no returning to old methods.

### ELECTION OF OFFICERS

The balloting for officers for the ensuing year resulted in M. H. Clapp being elected chairman; J. F. Caskey, first vice-chairman; and H. Hulatt, second vice-chairman.

The Members of the Committee of Direction, elected are: G. A. Cellar, E. A. Chenery, W. H. Hall, C. S. Rhoads, L. S. Wells, and F. T. Wilbur.

Committee on Nominations, J. C. Armstrong, William Bennett, W. H. Hall, E. L. King, and C. S. Rhoads.

### THE BANQUET.

On the evening of June 12, the members of the Telegraph and Telephone Division, and affiliated members, were given a banquet at the Hotel La Salle, all arrangements for which were made by the Railway Telegraph and Telephone Appliance Association. The officers of the Association are: A. D. Walters, chairman; G. A. Graber, vice-chairman; G. A. Nelson, secretary-treasurer. The executive committee consists of the chairman, vice-chairman, and Messrs. B. A. Kaiser, E. E. Hudson, W. T. Kyle, A. D. Smith, Val B. Minton and G. K. Heyer.

The banquet was attended by practically all those who attended the convention, together with the wives and daughters of many of the members. The officers seated at the head table were: M. H. Clapp, E. C. Keenan, H. Hulatt, G. A. Cellar, William Bennett, J. A. Jones, E. A. Chenery, and Messrs. Chas. Selden, and E. E. Nash, the latter representing the federal manager of the Northwestern Region, U. S. R. A.

After a few opening remarks suitable to the occasion, toastmaster Clapp introduced Charles Selden, one of the pioneers of the old Association of Railway Telegraph Superintendents, who told of the beginnings of the organization. Mr. Selden's speech, while in a reminiscent vein, was a model of cleverness and wit, and he was accorded what must have been for him a gratifying measure of applause.

Mr. Selden was followed by Mr. Nash of the Chicago and Northwestern Railroad, who gave an excellent talk on the future importance of electric communication on railroads. Mr. G. A. Cellar then gave a talk on the subject of the amalgamation of the Association of Railway Telegraph Superintendents with the American Railroad Association, and Mr. H. Hulatt, in an interesting talk, spoke of the increasing value of the engineer in railroad telegraph work. After the banquet the floor of the ball room was cleared for dancing which continued until midnight.

B. A. KAISER,
American Telephone and Telegraph Company,
New York.
Chairman Entertainment Committee,
Telegraph and Telephone Appliance Association

### NEXT MEETING

The next meeting of the Telegraph and Telephone Division will be held December 3, 4 and 5, next, probably in Chicago.

The railroads represented at the convention, and their representatives are:

Ann Arbor Railroad: Thomas E. Lahy.

Atchison, Topeka, and Santa Fe Railway: H. C. Chace, W. S. Ronk, A. W. Sine, and H. F. Rupple.

Baltimore and Ohio Railroad: Charles Selden, C. A. Plumly, E. W. Day, B. F. Thompson, J. L. Nichols, and J. H. Young.

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Bessemer and Lake Erie Railroad: F. W. Smith, and L. J. Henderson.
Boston and Albany Railroad: A. R. Belmont.
Buffalo, Rochester and Pittsburg Railroad: E. W. Kolb.
Central Railroad of New Jersey: F. G. Sherman.
Central Vermont Railroad: M. Magiff.
Chesapeake and Ohio Railroad: C. L. Guthrie.
Chicago and Eastern Illinois Railroad: Charles McCormick.
Chicago and Northwestern Railroad: William Bennett, and W. P. McFarlane.
Chicago and Western Indiana Railroad: W. B. Abbott.
Chicago, Burlington and Quincy Ralroad: C. W. Fraher.
Chicago, Indianapolis and Louisville Railroad: E. G. Stradling.
Chicago Great Western Railroad: G. O. Perkins.
Chicago, Milwaukee and St. Paul Railroad: E. A. Patterson, A. C. Adams, and A. A. Birler.
Chicago, Rock Island and Pacific Railroad: G. D. Hood, A. W. Douglas, and R. W. Potts.
Chicago, Terre Haute and Southeastern Railroad: F. H. Van Etten.
C. C. C. and St. L. Railroad: C. S. Rhoads,, J. G. Gilgrist, and John L. Niesse.
Colorado and Southern Railroad: J. L. Henritzy.
Cumberland and Penna. Railroad: J. T. Robertson.
Delaware, Lackawanna and Western Railroad: L. B. Foley.
Denver and Rio Grande Railroad: J. M. Walker, and G. W. Osborne.
Denver and Salt Lake Railroad: C. A. Parker.
Elgin, Joliet and Eastern Railroad: V. W. Brooks and E. L. Callahan.
Erie Railroad: E. P. Griffith.
El Paso and Southwestern Railroad: M. O. Scobee.
Grand Trunk Railway: H. Hulatt, Thomas Rodger, and A. P. Linnell.
Great Northern Railroad: J. C. Rankine and R. C. Thayer.
Gulf, Colorado and Santa Fe Railroad: J. Matthews.
Hocking Valley Railroad: B. J. Schwendt.
Illinois Central Railroad: F. T. Wilbur, E. A. Burkitt, H. C. Hewes,, and G. R. Stewart.
Indiana Harbor Belt Railroad: W. L. Connolly
Kansas City Southern Railroad: R. Hooper.
Kansas City Terminal Railroad: C. E. Marsh.
L. and N. E. Railroad: J. E. Hackman.
Lehigh Valley Railroad: J. F. Caskey.
Long Island Railroad: L. S. Wells.
Louisville and Nashville Railroad: R. R. Hobbs.
Maine Central Railroad: J. B. Norcross.
Minneapolis, St. Paul and Sault Ste Marie Railroad: G. H. Mayer.
Michigan Central Railroad: J. J. Ross, W. A. Jackson, and H. C. Pfeifer.
Minneapolis and St. Louis Railroad: R. E. Ryan.
Missouri, Kansas and Texas Lines: W. H. Hall.
Missouri Pacific Railroad: E. A. Chenery, Worth Rogers, J. C. Browne, and C. E. Wynne.
New York Central Railroad: E. C. Keenan, R F. Finley, S. L. Van Atkin, Stanley Rhoads, G. J. MacKenzie, A. Behrer, and J. C. Deck.
Northwestern Telegraph and Telephone Company: Leslie H. Jenks.
New York, Chicago and St. Louis Railroad: W L. Blair, and G. J. MacKenzie.
New York, New Haven and Hartford Railroad: H. A. Shepard.
New York, Ontario and Western Railroad: G. H. Caley.
Northern Pacific Railroad: E. E. Dildine.
Oregon Short Line Railroad: M. H. Brown.
Pennsylvania Railroad: G. A. Cellar, J. C. Armstrong, I. C. Forshee, L. K. Ege, E. W. Zimmerman, Jacob Bright, C. E. Kendig, John P. Harper, John Miller, E. L. Irving, John H. Ditch, M. J. Keily, G. A. Dornberg, and L. Behner.
Pere Marquette Railroad: G. W. Trout, and F. A. Merrill.
Pennsylvania and Reading Railroad: L. D. Shearer.
Pittsburg and Lake Erie Railroad: P. A. Lee, and A. E. Roush.
Richmond, Fredericksburg and Potomac Railroad: T. R. Gooch.
St. Louis and San Francisco Railroad: J. H. Brennan.
Southern Railway Lines: J. A. Jones, and A. W. Beauprie.
Southern Pacific Railroad: E. L. King, Percy Hewett, and W. S. Melton.
Terminal Railroad of St. Louis: F. E. Bentley.
Toledo, St. Louis and Western Railroad: Chester J. MacPherson.
Toledo Terminal Railroad: H. I. Lanow.
Union Pacific Railroad: P. F. Frenzer and John Hilbert.
United States Railroad Administration: Martin H. Clapp.
Wheeling and Lake Erie Railroad: P. Vlirt.
American Railroad Association: W. A. Fairbanks, and S. M. Campbell.

Affiliated members and guests of the Telegraph and Telephone Division present:

J. J. Ghegan, president J. H. Bunnell & Co., New York; B. A. Kaiser, American Telephone and Telegraph Company, New York; Donald McNicol, editor TELEGRAPH AND TELEPHONE AGE, New York; Charles Gilman, Massey Concrete Products Company, New York; J. E. Dempsey, Chicago; K. L. Wilkinson, American Telephone and Telegraph Company, New York; Godfrey Gort, L. S. Brach Mfg., Co., Newark, N. J.; Thomas R. F. Payton, Bell Telephone Company of Pennsylvania; M. H. Wagner, Paul A. B. Sahm and M. G. Lloyd of the Bureau of Standards, Washington; A. G. Francis, Chicago Telephone Company; George M. Dodge, Valparaiso, Ind.; P. W. Drew, Chicago; P. A. Garrity, Thomas A. Edison Company; F. L. Eldridge, Madison, Wis., D. R. Day, Hall Switch and Signal Company; O. F. Cassaday, Kellogg Switchboard and Supply Company; E. Kleinschmidt, New York;

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P. Hetenyi, New York; F. A. Cannon, Mountain States Telephone and Telegraph Company, Denver, Colo.; J. O. Carr, Morkrum Company, Chicago; A. D. Walters, New York Telephone Company; Val B. Minton, Southwestern Telephone and Telegraph Company.

The Western Union Telegraph Company was represented by R. E. Chetwood, plant engineer; H. W. Drake, apparatus engineer; Paul J. Howe, construction engineer, and G. E. Sharp, district plant superintendent.

The Western Electric Company was represented by G. K. Heyer, John B. Harlow, J. P. Casey, C. R. Wharton and John C. Binning.

## Railroad Telegraph Notes.

SYMPATHY IS EXTENDED to O. C. Greene, formerly superintendent of telegraph of the Northern Pacific Railroad, St. Paul, Minn., who five years ago retired from active service, in the death of his wife, who passed away at Washington, D. C., on April 21. Interment was at St. Paul, Minn., Mr. Greene and his daughter accompanying the remains to that place.

S. U. RHYMER was on June 4 appointed superintendent of telegraph and signal engineer of the Chicago and Alton Railroad, with headquarters at Bloomington, Ill., vice G. W. Hulsizer, deceased.

## INDUSTRIAL.

### Roger Fison,

ADVERTISING MANAGER OF "TELEGRAPH AND TELEPHONE AGE."

Roger Fison has become associated with TELEGRAPH AND TELEPHONE AGE as advertising manager. Mr. Fison has had long experience in the telegraph field as commercial and railroad operator, Associated Press operator, and as division editor. During the past ten years Mr. Fison has, in his spare time, been engaged in literary work, and in recent months has made a special study of modern advertising methods and requirements.

FRANK L. ELDRIDGE, during the past four and a half years special representative of the Kellogg Switchboard and Supply Company, Chicago, has become associated with the French Battery and Carbon Company of Madison, Wis., as general sales representative, with offices at 20-24 West Washington Street, Chicago. Mr. Eldridge has had long experience in the railroad and telephone fields. His first employment was in the engineering department of the Santa Fe Railroad. From 1903 until 1912 he was connected with the Chicago Telephone Company, and the American Telephone and Telegraph Company, in the engineering, operating and commercial departments. From 1912 until 1915 Mr. Eldridge was identified with Independent telephone interests, and has served as secretary of the Central States Telephone Service Association, which became the service department of the Independent Telephone Association of America. Mr. Eldridge is one of the most popular and successful telephone salesmen in the country.

THE WESTERN ELECTRIC COMPANY has declared a quarterly dividend of $2.50, also a quarterly dividend of $1.50 on preferred stock, payable June 30 to stockholders of record June 22.

THE ELECTRIC STORAGE BATTERY COMPANY has declared a quarterly dividend of one per cent., also a quarterly dividend of one per cent on preferred stock, both payable July 1 to stockholders of record June 16.

## Single Line Repeater.

The single line telegraph repeater manufactured by the Jester-Cooper Company, Houston, Tex., is being used successfully on several large railroad systems and in commercial telegraph service.

The management of this repeater is as simple as that of an ordinary single relay and sounder set, with which all telegraph operators are familiar. No local battery is required in its operation.

## The Western Union Multiplex.

The Western Union multiplex system is completely described in a neat pamphlet published by TELEGRAPH AND TELEPHONE AGE. The description of the system has been revised and brought up to date and the work is fully illustrated with views of the different pieces of apparatus. It was gotten up primarily as an appendix to Jones' Pocket Edition of Diagrams and Complete Information for Telegraph Engineers and Students, but some copies have been bound separately for the use of those who wish to carry it apart from the parent book as a matter of convenience. The booklet is the same size as the Jones' book, and can therefore be easily carried in a coat pocket. It will be found very serviceable to those who are studying the multiplex. The price of the pamphlet is 35 cents per copy. Send orders to TELEGRAPH AND TELEPHONE AGE, J. B. Taltavall, publisher, 253 Broadway, New York.

"REMCO"
ALTERNATING CURRENT SELECTORS
(Controlling Patents)
Tested and Proved
Manufactured only by the
RAILWAY ELECTRIC MANUFACTURING CO.
250-252 West Water St. MILWAUKEE, WIS.

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# QUESTIONS AND ANSWERS

### Heat Coils.

L. E. S.—Heat coils in telephone circuits are used in both common battery and local battery exchanges, and to some extent at local battery subscribers' stations. It is not necessary to employ them in common battery subscribers' stations owing to the fact that the condenser in the bell circuit prevents the flow of direct current through the ringer windings, the impedance being high enough to prevent the flow of excessive alternating currents.

### Relay Windings in Multiple.

F. F. N.—Ordinary 150 ohm telegraph relays may be reduced in resistance to 37½ ohms by connecting the coil windings of the relay in multiple instead of in series. When 37½ ohm relays are used it is necessary that all relays in circuit be of the same resistance.

### "Leg" Circuits.

W. M. V.—In main telegraph offices, circuits referred to as "legs" are extensions of duplex or quadruplex locals to operating tables or to branch offices. The duplex or quadruplex set proper may be located at any convenient point in the operating room or multiplex department, and by means of leg circuits the control of the multiplex apparatus may be assigned to operators located at any office in the city, or in a distant office. At the branch office the operator requires only a key and sounder on the sending side and a sounder on the receiving side in order to work the wire as a duplex.

### Series and Bridging Telephones.

C. H. T.—In a one-wire telephone circuit using series magnetos the magnet windings of the ringer are of low resistance (20 to 50 ohms). Any intermediate telephone sets connected in the line are hooked up in series, ground connection being made only at each terminal.

A one-wire circuit equipped with bridging telephones has magnetos with ringer magnets wound to 1,000 or 2,000 ohms resistance; both at intermediate sets and at terminal sets one terminal of the set is connected to earth. Two-wire, or metallic circuits, are equipped with magnetos having ringer magnets wound to 1,000 or 2,000 ohms resistance, the intermediate and terminal telephone sets being connected directly across the two line wires. With these sets ground wires are not employed except as escapes for lightning discharges through high resistance or vacuum lightning arresters.

### "Journal of the Telegraph."

M. M. L.—The publication of the Western Union Telegraph Company's monthly journal, the *Journal of the Telegraph,* was discontinued in June, 1914.

### Wheatstone Bridge.

W. E. C.—A Wheatstone bridge consists of a set of resistance coils, the total resistance of which may be varied by means of switches, in combination with a galvanometer. This instrument is used for measuring the resistance of coil windings, line wires and cabled conductors; also for determining the location of crosses, grounds, escapes, *et cetera,* of telegraph and telephone circuits.

### Date of Invention of Repeaters.

L. M. T.—The Milliken repeater was invented in 1862, the Hicks repeater in 1863, and the Stearns duplex in 1868.

### Bug Trap.

S. A. J.—The bug trap, so called, is a relay employed on the neutral, or common, side of the quadruplex to insure solid, readable signals in the sounder. When a bug trap is not employed, the signals received on the common, or neutral, side of the quadruplex are likely to be shaky and uneven, due to the periods of no-magnetism in the neutral relay, while the pole-changer at the distant station is being reversed by the operator sending on the polar side of the set.

### Residual Magnetism.

Arthur H.—If the iron of which the cores of relay magnets is made is not properly annealed (softened), the cores will in time accumulate a certain amount of residual magnetism. When the cores possess residual magnetism, the relay is not so sensitive, nor will the relay work so fast as when no residual magnetism is present. This is owing to the fact that the retractile spring of the relay must be given a greater tension, or pull, to withdraw the armature when the line key is opened in the act of sending Morse signals. This information refers to single line relays, not to duplex polar relays.

### Radio Detectors.

C. P. D.—The Perikon detector is a combination of zincite and chalcoprite. The Pyron detector consists of a metallic contact on pyrites.

### The Dempsey Code.

F. D. E.—The Dempsey Code is a cipher arrangement for condensing the number of words in telegrams. It is issued in loose-leaf form as well as in book form.

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# Electro-Physics for the Telegraph, Telephone and Radio Student

No. 8.

In the June 16 installment of this series of articles were presented diagrams picturing the decay of electric oscillations from maximum to zero potential. Fig. 4, herewith shown, represents discharges which do not die down to zero, and which are said to be continuous, undamped, or sustained oscillations. Compare this illustration with the two diagrams reproduced in the previous article and it may be observed that the magnitude of the positive and the negative impulses of the transmitted current in the present case at each swing reach the same value and are constant, while with the free or

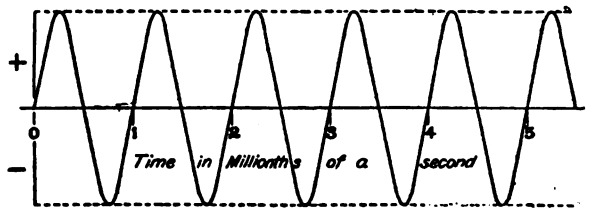


FIG. 4.

damped oscillations the positive and negative impulses gradually die away to zero.

Undamped oscillations cannot be produced by the discharge of a condenser through an ordinary spark gap, but may be produced by any of the methods referred to in article No. 6, June 1 issue.

### CURRENT THROUGH CONDENSER.

In the dielectric or insulating medium of a condenser the electrons are regarded as bound, or tied, as it were, to the material atoms or molecules of the insulating medium. For an alternating electromotive force large current volumes may be set up but cannot be maintained unidirectionally. In conducting wires this limitation does not exist; the electrons are free to travel in a complete physical circuit.

Consider the case of an air condenser; that is, one in which air is employed as the insulating medium between the plates. The question arises as to how an alternating current can be maintained when there is nothing but air (and ether) between the plates. Does not such a medium constitute an insulator? So far as alternating currents are concerned the answer is, "No."

Devoid of mathematics, the modern electron theory of electricity establishes that electrons are minute carriers of electricity, having a mass about $^1/_{2000}$ part of the mass of a hydrogen atom. Electrons are negatively charged and are ordinarily attached to the atoms, but may be detached from them in various ways. In a simple metallic conductor with no current flowing in it the electrons are attached to the atoms. When the conductor is charged negatively, additional electrons are added to it; and when the wire is positively charged there exists a deficiency of electrons as compared with the number present when the wire was uncharged. Therefore, a current of electricity is a stream of negative electrons and the direction of the stream is always from the negatively charged terminal of the conductor toward the positively charged terminal. The student will note that the electron stream is in the reverse direction to that of the generally accepted direction of current flow in a circuit.

Now, when a condenser is connected with a source of electric current, a stream of negative electrons flows from the negative terminal of the source of current to one terminal of the condenser (one plate or set of plates), and an equal stream of electrons flows from the opposite plate or set of


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plates of the condenser to the positive terminal of the source of current. The result is that in the plates negatively charged there is an excess of electrons; or, at least, a greater number than was present in the metallic plate before the source of electromotive force was applied to it. At the same time there will be a reduction in the number of electrons in the opposite plate or plates, hence that side is positively charged.

So far as the source of current and the wires connecting it to the condenser are concerned, the effect is the same as if a current flowed from the negative terminal of the battery (or other source) through the condenser to the positive terminal. This is the charging current and it flows in this manner until there has been accumulated on the plates connected with the negative terminal of the battery a negative charge such that it repels an electron with the same force as does the positive terminal of the battery. When this condition is reached no more electrons can be moved along the connecting wires, and current ceases to flow; the charges, however, remaining on the condenser plates. If it is desired to increase the charge on the plates, a source of electromotive force of a higher value must be substituted for the one previously used.

## SHOP TALK.

### Attention at Repeaters.

BY THE OBSERVER.

One of the most trying experiences a repeater chief has is when someone asks a distant office to write and then allows him to continue sending for several minutes. This habit should be discouraged, and competent repeater men will not be guilty of such practices.

On long circuits there are several testing and regulating men held at the particular circuit waiting until the terminal stations are satisfied; and, surely, after the sender writes for a fraction of a minute, or makes a few series of dots, one should be able to determine whether or not the circuit is in working order. Often the excuse for this action is given as, "I am waiting to see if any trouble shows up." Now, while you are waiting to see if trouble shows up, why not allow the terminal stations to start, thereby preventing a delay to business, and not try the patience of several attendants along the route who have other circuits waiting for attention. The same remarks apply to operators.

Another source of annoyance and delay is caused by the terminals stating the trouble as they see it, and then deserting the circuit for several minutes. While it is good economy that we do not keep two men on one circuit for test purposes, it is poor economy to hold a number of testing and regulating attendants because of inability of the traffic force at the instant to take care of their part of the work. If at a given time the traffic supervisor finds it necessary to remove both operators, he should protect the position in some way so that the call will be answered, and the necessary "writing" done with a sending machine, if a machine is to be used for regular transmission on that circuit. It should be remembered that many circuits perform satisfactorily with hand sending, which operate poorly when a machine is used. Another requirement which seems unreasonable is for repeater chiefs to insist upon operators ringing in repeater attendants, and as soon as the testing and regulating men respond they are told to write. Why not act upon the writing of the operator working the circuit? Generally they are better senders than the testing and regulating attendant. If for any reason it is thought that the machne or transmitter is defective, do not hesitate to say so, but gain time by ceasing to call for the testing and regulating men at terminals so they may write. This is not only wasting your own time, but the time of other circuit attendants; also, you are thereby delaying traffic.

Most of us have observed that there is too much unnecessary conversation over wires between testing and regulating attendants and operators working wires. A development of the future will be that there will be less of this. Remarks should be confined to matters of immediate importance in connection with the operation of the circuit. Be as brief as clearness will permit.

*(To be continued.)*

## THE O. O. COLUMN.

BY THE ONLOOKER.

He was one of the old school—retired. Hearing of the new, up-to-date office, he dropped in to give the place the "once over." He noticed that in the testing and regulating department there were many youngsters.

The chief operator on duty at the time asked the old-timer what he thought of the layout, and received the reply: "It's great! But your repeater department reminds me of Chinese music."

"How so?" asked the chief operator.

"Well," answered the old-timer, "because there are so many meters and minors."

---

There had been one of the periodical scraps on a multiplex circuit, with some tried-and-true, and some original personal biography interchanged. The repeater chief had it all on his undulator tape. One of the young ladies from another department, passing by, stopped for a moment and remarked that she wished she could read that stuff on the tape. Somehow, the chief was glad the young lady could not read it, and stated that those particular vibrations were a sure sign of circuit trouble.

---

In a certain large telegraph office there is an operator—Kimball by name—who weighs about the same as a farm tractor. A newly arrived repeater attendant in that office, when asked by a distant circuit attendant if he could "lift Kimball," replied that he certainly could not; that only an elevator could do that.

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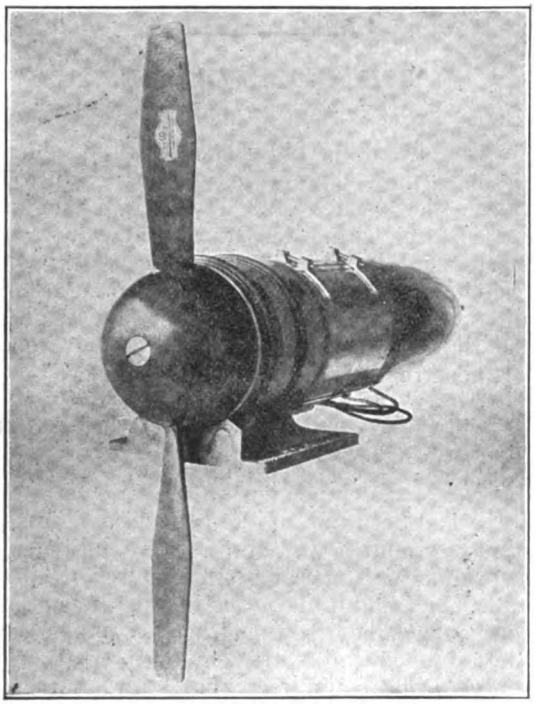
# RADIO TRANSMITTING SETS ON THE NC TYPE SEAPLANES

Although the type of aircraft radio transmitter here described and illustrated was designed for HS type seaplanes, it was first installed on the NC type of flying boat in the recent trans-Altantic flight.

These sets were designed to give a normal operating range of 350 to 400 miles under ordinary or about 250 miles under adverse transmitting conditions, although under more favorable conditions they have a greater range, such as was demonstrated during the recent trans-Atlantic flight of the NC-1, NC-3 and NC-4 flying boats. During this flight the navy department states that these transmitting sets were heard and copied over a distance of 1200 miles.

The complete set consists of all the accessories necessary to install, repair, and replace broken parts, but only the actual set as installed in the plane will be described.



THE COMPLETE TRANSMITTING SET.

The transmitter itself consists of a 550 watt, self-excited inductor type alternator, an aluminum sheet or casing, of the same diameter as the generator and attached to the rear thereof, and in which are contained the power transformer and the rotary spark gap. To the end of this aluminum shell is attached a streamlined hood, composed of fabric impregnated with bakelite. This serves as an inclosure for the condenser and the oscillation transformer which are, however, bolted to the aluminum shell extending back from the generator, rather than receiving any support from the hood. The hood also is attached to the aluminum shell, by means of slotted channels and spring dowels, which make it readily removable for inspection and adjustment. The aluminum casting is also provided with a watertight hand hole, by which access may be had to the rotary gap.

The generator itself is a special inductor type alternator, designed for a speed of 5000 r.p.m. and develops from 135 to 150 volts on open circuit at 1000 cycles. The full load voltage is approximately 100 volts. The stator consists of four direct current poles, into each of which are cut four slots for the alternating current winding. The rotor is made with twelve teeth and acts as the inductor. The direct current winding for exciting the field is wound in the slots between the teeth and delivers current to the field through an externally mounted field switch. The switch is arranged so that the alternator field circuit is closed only when transmitting, and in closing the circuit a battery is momentarily connected in to insure its building up.

The gap equipment comprises two rotors, one having twelve and the other eight teeth mounted directly on the generator shaft by an insulating molded hub. This gives the set two different spark tones, 1000 and 666 sparks per second, which greatly increases the selectivity of the transmitter. The fixed element consists of two tungsten electrodes mounted on a holder which can be rotated through 180 deg.; the other electrode is brought into use with the twelve-tooth rotor, while the one located opposite the eight-tooth rotor is inoperative. By means of an eccentric bushing in the bracket by which the electrode holder is mounted on the generator rear bearing housing, the distance between the tips of the rotor teeth and the fixed electrode can be adjusted. The angular adjustment is obtained by loosening the clamp that holds the electrode bracket.

The power transformer is of the closed core type, the ratio of transformation being approximately 1 to 34.

The condenser is of the mica dielectric type, having a capacity of 0.010 mf., and is mounted by means of an aluminum casting which also supports the oscillation transformer.

The latter is of the conductively coupled type and consists of seven turns of No. 10 B and S bare copper wire wound in grooves in a bakelite cylinder. Three taps are brought out, with suitable terminals for the primary connection, by which the primary can be adjusted to wave lengths of 335,

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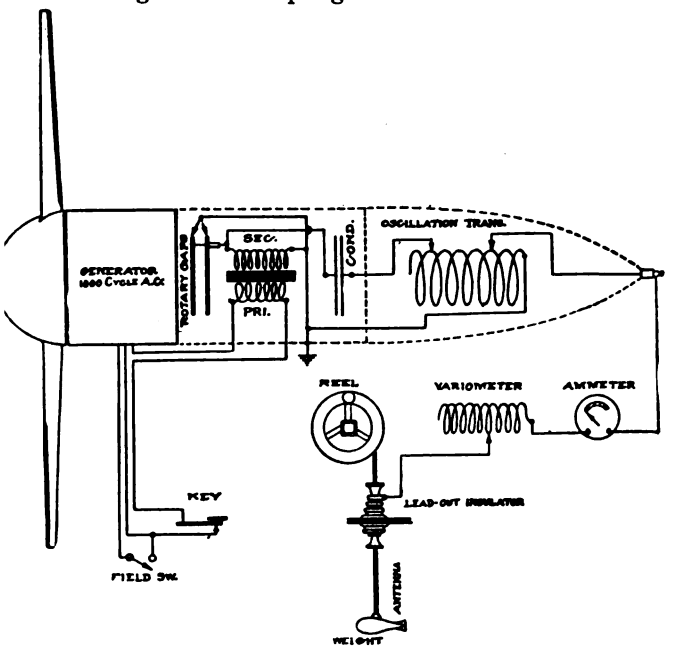
375, and 425 meters. The terminals for the primary connections are mounted on the base of the oscillation transformer. The coupling taps are brought out to a switch located on the rear end of the oscillation transformer, and permit adjustment to six degrees of coupling.




DIAGRAMMATIC CROSS-SECTION.

The antenna used is of the trailing type, consisting of a 250 ft. length of silicon bronze stranded antenna wire to the end of which is attached a stream-lined lead weight. The antenna is brought into the cockpit through insulators having a metallic bushing with flared ends to a reel upon which the antenna is wound when the plane is about to descend. Connection to the antenna is made by a terminal connected to the bushing in the insulator.

The antenna is paid out to its full length, and the open circuit tuned by means of a variometer which is assembled to include a hot wire ammeter for indicating resonance.

The variometer consists of fifty turns of No. 14 B & S bare solid copper wire wound on a thin, hollow cylinder. The inductance is varied by means of a trolley, hand operated through a rack and pinion, which moves parallel to the axis of the coil, and makes contact with the bare turns of the coil through a recess cut in the cylinder. The trolley can, therefore, be made to cut in, or out, one turn of wire at a time as it is moved along. The dead end of the coil is connected to the trolley contact and is thereby short-circuited. A copper ring moving with the trolley inside the coil serves to prevent sparking at the trolley contacts by shielding the magnetic lines of force from the turn short-circuited by the trolley.

The transmitter is usually mounted on the boat by means of a special strut or wing fitting, usually on the lower side of the upper frame. On the NC type of trans-Atlantic seaplane a special mounting was arranged on a rear strut in the center of the boat, so that when the boat was not flying, the transmitter could be moved up on the strut into the wash of the propeller of the centre engine. This engine could then be run at a speed not sufficient to cause the boat to move, but still sufficient to operate the radio set. A skid-fin antenna is used when operating under these conditions. This antenna amounts to nothing more than a T antenna strung across the top of the boat between the skid-fin of the plane and a lead-in dropped down from the center. The ground is made at the keel of the boat.

The leads from the transmitter are brought through the wall of the boat to the cockpit. In order to make it possible to operate the set from various points of the boat several keys are installed. These keys are of the flame-proof type and are equipped with winker lamps connected to a transformer across the key contacts, which serve to indicate whether or not the line is in use. When no keys are being operated the lights burn continuously until one operator presses his key. Then all lights go out corresponding to the operation of the key.

The set here described was designed and built by the International Radio Telegraph Company of New York.

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# A NEW TYPE OF CIRCUIT FUSE

## THERMAL FUSE — VACUUM ARRESTER

Companies maintaining low voltage lines, such as telephone, telegraph, police, fire and railway signal, have been protecting their circuits from induction, lightning or crosses by the use of arresters and fuses. Arresters and fuses have undoubtedly saved many instruments from damage or loss and, as a result, are in practical use in all parts of the world. The advancements made by increasing the effectiveness and reliability of fuses and arresters have shown much progress, but, notwithstanding, many companies are still losing apparatus and subjecting their pole boxes, pole lines and instruments to losses under conditions which they have not yet been able to control, and the regulation protective apparatus now on the market has not fully met all the requirements. One of the objections to many methods of protection, is the frequent loss of fuses. This loss cannot be expressed merely in dollars and cents, as to the cost of the fuse itself or the time of replacement, but to this loss may also be charged the interruption of service and the inconvenience to the subscriber of the telephone or telegraph company. This condition has left an opportunity open for a design of instrument to effect the following purpose:

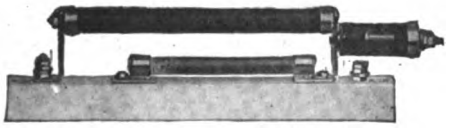

FIG. 1.

First: To insure full protection in event of low amperage sneak currents entering the circuit and functioning through the arrester continuously until the arrester catches fire and becomes a fire hazard.

Second: To reduce the number of fuse burn-outs.

Minor M. Davis, electrical engineer of the Postal Telegraph-Cable Company, has given much study to this subject and has designed and patented a thermal arrester intended to reduce to a practical minimum, interruptions of service, loss of fuses, and incidentally to increase the safety of the housing and support of these arresters.

### LOSS OF FUSES.

The National Board of Fire Underwriters' requirements clearly prescribe that in low voltage circuits, fuses shall be placed on the line side, the arrester to be on the instrument side suitably connected to ground. For the practical protection of the instrument fuses have been kept at a very low current rating or within a reasonable degree below the current carrying capacity of the instrument, to insure the fuse functioning before the instrument is affected. The capacity of the fuses in the past has been in no way dependent upon the current capacity of the arrester itself, but only upon the instrument to be protected to offer a factor of safety for its protection. It may be noted that where the 3-ampere fuse is used in a circuit to protect an instrument, and the arrester is capable of carrying from ten to fifteen amperes in safety, the fuse will frequently blow, while the arrester itself will remain intact if

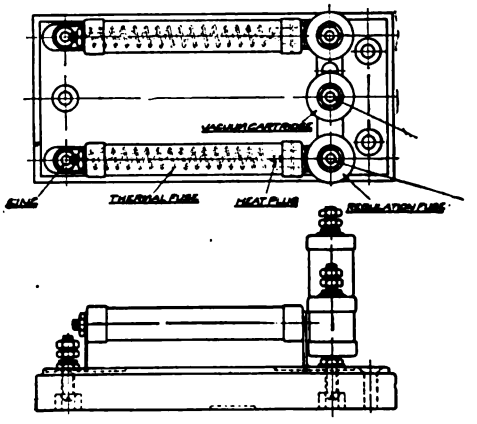


FIG. 2.

the fuse capacity is increased two, three, or more times. At the same time the fuse was limited to this capacity owing to the size of the wires in the instrument proper. It is therefore worked out that to avoid these frequent losses of fuses a practical protecting instrument could be made, placing the low capacity fuse on the instrument side and a fuse of high capacity on the line side. That the current coming into the line and passing through the arrester to ground shall not blow the fuse on the line side as readily as in the former case, and the capacity of the fuse on the line side shall then be within a factor of safety limited only by the carrying capacity of the arrester and be governed by that only. This was the first step in the design of the improved arrester.

Experience shows that frequent interruptions of service are caused by crosses with high tension circuits of low current. These currents find their way to the lightning arrester and sometimes continually function across the arrester without blowing the fuse. The arrester becomes hot and sometimes sets

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fire to the adjoining equipment; and, in some cases, the equipment, pole box, or building is injured. To prevent this risk, and at the same time not introduce any delicate mechanism, the Davis thermal fuse was designed to function due to the heat of the arrester parts. This thermal fuse is spring operated. A spring is held under tension by a low-melting fuse-plug of bismuth. The bismuth plug is in metallic contact with the arrester proper. On the overheating of the arrester this fuse melts, the spring functions, and the circuit is thereby opened. It should be noted that in the construction of the Davis Ther-

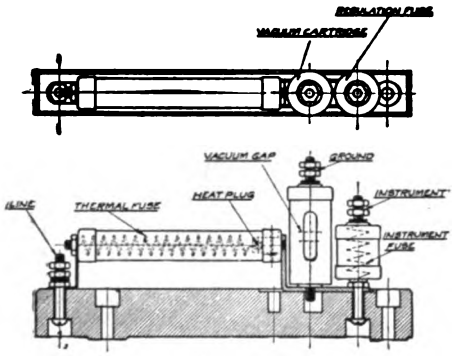


FIG. 3.

mal fuse, the fuse will not function nor will the circuit open, nor will it introduce any loss unless an actual dangerous condition occurs, as the parts have been made substantially large and strong to take care of these conditions. It should also be noted that the arrester is safeguarded by the thermal fuse, while the instrument is fully protected on the instrument side by as delicate a fuse as that particular instrument may require. It is therefore expected that the results of the installation of the this type of fuse will greatly lessen interruptions to service and also improve the protection afforded the apparatus.

Fig. 1 illustrates a Davis thermal fuse of the single line type, permitting a 3-¼" break in the spring fuse, and a 4-½" break in the instrument fuse.

Fig. 2 illustrates a standard subscriber telephone equipment of the all metallic type equipped with thermal fuses.

It will be noted in the cartridge fuse protecting the instrument, a 5" fuse is used, but one spiral around a porcelain bobbin. The thermal fuse is an added protection to the spiral fuse in case of an arc-over or in case of a burn-out of the arrester, so that in this case, double protection is provided.

## Cable Codes.

TELEGRAPH AND TELEPHONE AGE is headquarters for all cable cipher codes. Telegraph managers would do well to bear this fact in mind when customers make inquiries regarding such codes. We are prepared to furnish full information on the subject, our knowledge being based on over thirty-five years' experience in handling the hundreds of codes on the market. Address TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

## New Oil Discoveries in the Southwest.

The wonderful oil fields of the Southwest are just becoming generally known and recognized as a great source of wealth. They are being developed by leaps and bounds. Thousands of acres are being secured by the old line oil corporation, local capitalists and business men under the advice of geologists and professional oil experts. Their "scouts" are overrunning Texas, New Mexico and Arizona.

El Paso is the center of activities of western Texas, New Mexico and Arizona, and is enjoying a great boom along these lines.

The location and drilling of test wells for oil is not the hit-or-miss, happy-go-lucky, proposition of the days when the name "Wild Cat" was coined. "Wildcatting" has since been reduced to something of an exact science by the research of geologists and experience of professional oil experts, so that wildcatting is right now being proven almost daily to have fallen within the range of legitimate business enterprise when honestly and faithfully undertaken.

It has been plainly demonstrated that there are most wonderful and extensive deposits of oil in the Southwest. We believe that the conditions now existing offer many good opportunities for investment. Care, however, should be taken to place such investments in carefully chosen ventures that are managed by men of known ability and integrity.

## Telephone Extension in Colombia.

In Colombia the government is contemplating the establishment of long-distance interurban telephone service to be operated in connection with the telegraph service, which is government owned. The principal telegraph offices are also to be provided with improved equipment to handle increased business. The work when done will be under the supervision of the Director General of Telegraphs, with whom interested firms should correspond. Correspondence should be in Spanish. The Director General's address is Bogota, Colombia.

## Submarine Cable Working.

"Beginner's Manual of Submarine Cable Testing and Working," by G. M. Baines, is a book of 265 pages dealing in a thorough manner with the operation of submarine telegraphs.

The first four chapters contain elementary matter relating to batteries, electrical laws, etc. Chapter V. covers copper resistance of cable, instrumental zero, false zero, theory of false zero test; and in the following eighteen chapters up to date matter is incorporated explaining cable insulation tests, inductive capacity of cables, tests for broken cables, curb transmitter, mouse mill device, recorder adjustment and other matter which should form a part of every cable man's technical knowledge.

The price of the book is $4.50, and copies may be obtained from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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## OBITUARY.

### Death of H. A. Tuttle.

Harry A. Tuttle, president and general manager of the North American Telegraph Company, Minneaopils, Minn., died in that city June 16. Mr. Tuttle was born in Oswego, N. Y., in the year 1846, and at seventeen years of age entered the telegraph service at Adams, N. Y. Later he entered the service of the United States Telegraph Company, at Illion, N. Y., and when that company was absorbed by the Western Union Telegraph Company, Mr. Tuttle was retained as manager at Illion. From 1876 until 1881, Mr. Tuttle was engaged in other business, but in the latter year re-entered telegraph service as operator for the Western Union Telegraph Company at St. Louis, Mo., a year later being made manager of the Minneapolis, Minn., office. In 1886, he took up the work of organizing the North American Telegraph Company, with which system he has been identified during the past thirty-three years.

In addition to his connection with the North American company, Mr. Tuttle has, since the year 1889, been superintendent and general superintendent of telegraph of the Minneapolis, St. Paul and Sault Ste. Marie Railroad.

In the twin-cities—St. Paul and Minneapolis—Mr. Tuttle had been over a period of a quarter of a century one of the leading spirits in business and civic affairs, and was well and favorably known to telegraph people throughout the entire country.

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JAMES B. MUIR, aged fifty years, an operator of Dallas, Tex., was found dead in bed on June 7. Mr. Muir had worked in many sections of the country and was credited with having made several trips around the world. He had been an operator in Dallas at various times covering a period of thirty years.

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A. J. MCALISTER, a widely known telegrapher on the Pacific Coast, assistant manager of the Federal Telegraph Company, San Francisco, died in that city on June 12th, at the age of fifty years. Mr. McAlister represented telegraph companies at the big sporting events taking place in California.

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MRS. STEVENS, wife of the late John O. Stevens, secretary of the Postal Telegraph-Cable Company, New York, died June 7. Mr. Stevens died February 14, last.

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IN THE DOMINICAN REPUBLIC, the government has appropriated the sum of $200,000.00 gold, to cover the cost of a telephone system in the city of San Domingo, and a telephone and telegraph line between San Domingo and Ciboa. The secretary of industry and communications will control the expenditures.

### A New Book for Students.

"THE REALITIES OF MODERN SCIENCE."

John Mills, the well known author of "Radio Communication," has written a new book with the title, "The Realities of Modern Science," which will be of particular value to students who desire to form a general and broad view of the development of science.

The general reader who has been amazed by the variety of the recent applications of science will find here a synthesis which will orient him in modern science. The earlier chapters develop the fundamental concepts in their historical and social setting. Later chapters introduce their quantitative relationships and will appeal to those who wish an exact but easily comprehensible treatment.

As an introduction to physical chemistry, lacking the formality of a text-book, the work meets a real need and should appeal to physicians, biologists, chemists, engineers, teachers, and students of science as well as to the average well-informed, well-read individual.

The book has 325 pages, 8 inches by 5 inches, and is illustrated. The price is $2.50 per copy and it may be obtained from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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### Electrical Measurements and Meter Testing.

This is a plainly written book, by D. P. Moreton. The book is particularly valuable to the telegraph and telephone engineers, because it deals directly with the subjects with which they are particularly interested. The voltmeter and the ammeter are the instruments used in this line of work, and these are to be found in all modern offices. Price, $1.00 per copy. For sale by TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York

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### New Western Union Telegraphic Code, Five-Letter Edition.

The New Western Union Telegraphic Code, Five-Letter Edition, has recently been placed on the market and the large sales of the book testify to its rapidly growing popularity. The business man needs this work, and when he sees it he instantly adopts it. The book contains 380,000 phrases, each phrase being represented by a five-letter word. These words are pronounceable singly or when two of them are joined together. The latter results in the saving of fifty per cent in cable tolls. The book weighs fifteen pounds, contains about 2,000 pages and measures thirteen inches in length by eleven inches wide, and is three and one-half inches thick. There is no waste space in the book. Every telegraph manager should call this book to the attention of his customers. The price is $30.00 per copy and it is on sale at the office of TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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REMITTANCES to Telegraph and Telephone Age should be made by draft on New York, postal or express money order, not by cash loosely enclosed in an envelope.
ANY NEWSDEALER in the United States or Canada can obtain copies of Telegraph and Telephone Age through the American News Company, New York.
BACK NUMBERS of this journal three or more months old will be charged for at the rate of 25 cents per copy.

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## RADIO TELEGRAPHY.

An inquiry conducted for the purpose of determining as nearly as possile the future field of radio signaling brings to light much interesting information. The results obtained with radio telegraphy and radio telephony during the war will undoubtedly have a material bearing upon the future of this art. The atmosphere has been cleared somewhat as to the relative roles to be played by wire signaling and wireless signaling. It is apparent that for a time wireless signaling will consist of supplementary service; the amount of traffic carried gradually increasing over a period of years before radio reaches that stage of development where wire methods of telegraphy may be regarded as supplementary.

One thing that is plain is that American inventors, engineers, and manufacturers have kept well abreast of the times, and are in a position to take care of not only American requirements but the radio needs of other countries. The unquestioned success of American methods and systems is an endorsement that will eventuate in the adoption of American methods and the use of American systems wherever competition is permitted.

The law, passed some years ago, requiring vessels with a stated number of persons aboard to carry radio apparatus and operators, is no longer regarded as imposing needless expense upon ship owners. Indeed, there is at the present time a very large demand for radio apparatus from owners and captains of vessels not required to maintain radio service. The condition of being out of touch with land,—its daily happenings, is no longer tolerable. Being *incommunicado* at sea, or elsewhere, is no longer excusable.

In the amateur field there have been some noteworthy, although quite natural, developments. The old familiar amateur, with his home-made outfit is still with us—at least a new generation of him is, but there has appeared a new grade of amateur, a type which might reasonably be termed professional amateur.

Many of the old amateurs were in the armies and in the navy, and during their war work became professionals and learned many things about wireless and about standard radio apparatus. Those in this class who have returned to pre-war employment are radio enthusiasts who are no longer satisfied with anything short of professional apparatus, and as the majority of them are earning salaries far beyond what was paid them in pre-war days, they are in a position to purchase what they prefer to own, rather than something recommended to be "good enough."

Also, the amateur field has been largely augmented by the addition of a great many telegraph and cable operators employed prior to the war in commercial and railroad telegraph service. Before the war land line telegraph men took only a passive interest in radio, but as thousands of Morse operators took up Sigual Corps work during the past three years, it is natural that a great many of them upon resuming their former positions should take up amateur radio work as a study, as a hobby, and with the idea ultimately of making that work their profession. A Morse telegrapher who is a good sender and receiver, and who has a mechanical bent very quickly develops into a first-class radio man. He has a decided advantage over the amateur who is not adept at dot and dash signaling.

Our book department reports a steadily increasing sale of books on wireless telegraphy to railroad and commercial telegraphers and undoubtedly manufactures of radio apparatus will be kept busy supplying the needs of these men for amateur equipment of a good grade.

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# CURRENT EVENTS

## EXECUTIVE OFFICE ANNOUNCEMENTS, PERSONAL MENTION, APPOINTMENTS

### PERSONAL.

CAPTAIN R. E. DELAY, of the Signal Corps, Washington, was a New York visitor July 3rd., calling upon several former associates in the telegraph business.

MISS LUCILE COLLETTE, the noted violinist, a daughter of Mr. N. T. Collette, an old-time telegrapher, now in another line of business at Seattle, has been engaged by the United States Government to play for the Doughboys in France this summer. Miss Collette was educated in Paris and will, therefore, be at home, as she is thoroughly familiar with French. She will return to the United States in the fall to fulfill important engagements. Miss Collette and her mother reside in New York.

W. H. SAWYER, formerly identified with the telegraph service, and later in the insulated wire business at Providence, R. I., who spent the winter at Pasadena, Cal., is located at Weekapang, R. I., for the summer months.

S. H. STRUDWICK, for many years identified with the cable station at North Sydney, N. S., now retired on pension, and who has been in New York during the past two months consulting eye specialists, has returned to North Sydney where he has his home.

### POSTAL TELEGRAPH-CABLE COMPANY.

CHARLES C. ADAMS, second vice-president of this company, has again been elected president of the village of Lawrence, L. I., where he has his home.

T. P. DOWD, manager, Bridgeport, Conn., was a recent visitor at the executive offices.

MISS HELEN D. REYNOLDS, daughter of Vice-President and General Manager Edward Reynolds, a Red Cross worker in France, arrived home on the S. S. *Noordam*, on Sunday, July 6, 1919.

THOMAS HOLMES, of our New York City and Troy, N. Y., offices, has arrived home from overseas, where he was engaged in Signal Corps work with the Army of Occupation

### WESTERN UNION TELEGRAPH COMPANY.

H. W. MOREHOUSE, of the plant engineer's office, has gone to Heart's Content, N. F., in connection with the work of installing the new cable station at that place.

A. H. MORGAN, of the plant engineer's office, has started on a trip which will include stops at Buffalo, Cleveland, Chicago, Omaha, Denver, Salt Lake City, Los Angeles and San Francisco, in connection with terminal office installations.

LOUIS F. WRIGHT, of the plant engineer's office, on June 25 was married to Miss Helen Luehr of Hoboken, N. J.

A. P. ACHIMORE, of the plant engineer's office, has returned from an inspection trip, having visited a number of offices in the Lake Division, looking over the power plants.

THROUGHOUT the company's service a number of the larger offices are being supervised direct by division general managers and their staffs; that is, as to operations, but not as to district reports. In the Eastern Division such offices as Buffalo, Philadelphia and Boston; and in the Lake Division, Detroit, Milwaukee, Cleveland, Cincinnatti and Columbus are in this class. Pittsburg office has recently been added to the list of offices in the Eastern Division to report direct to the general manager. The officials at Pittsburg are: C. R. Collins, city superintendent; G. E. Taylor, assistant superintendent; M. T. Finnell, superintendent of delivery; W. B. O'Hara, chief accountant; M. H. Hughes, cashier; A. Carless, manager of credits and collections; and S. B. Ines, superintendent of the service department.

W. A. WALLACE, A. M. Powers, J. K. Haggeman, and Robert Bucher, all of whom served as officers with the United States army in France, have returned home and resumed their old positions in Vice-President Fashbaugh's office.

G. GREEN, division auditor at Dallas, Tex., has been appointed division auditor of the Eastern Division, with headquarters at New York.

M. J. CAREY, since January 1918 manager at Watertown, N. Y., has been transferred to the managership at Springfield, Mass. L. S. Miller of Ithaca, N. Y., succeeds Mr. Carey as manager at Watertown.

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A DEPARTMENT MEETING was held in Salt Lake City, June 25, for the purpose of organizing to improve the service to the public and to plan for expected increase in business. Among those who addressed the meeting were: U. G. Life, district commercial superintendent; H. W. Deneke, manager; J. B. McLeod, assistant manager; C. R. Lundquist, commercial agent, and E. B. Thomson, delivery supervisor.

W. R. SLAGLE, formerly district manager of the first district, Southern division, has been appointed manager of the main office in Birmingham, Ala., succeeding W. D. Stead, who becomes district manager of the fifth district, Southern division.

## Western Union Salary Increases.

RETROACTIVE TO AUGUST 1, 1918.

Under date of July 1, Newcomb Carlton, president of the Western Union Telegraph Company, issued instructions governing the adjustment of salaries of employees of the company, specified in the Postmaster General's order of Decemebr 31, 1918.

The increase of wages is made retroactive to August 1, 1918, and at the request of the Association of Western Union Employees, the company has extended the provisions to apply to non-members as well as members of the association.

Briefly, the new schedule means that employees who on August 1, 1918, had been in the service continuously for six months and not more than one and one-half years receive an increase of five per cent.; those in the service for more than one and one-half years at that date, ten per cent.; percentage increase not to apply to premium earnings. The increases to be reckoned on the salaries in effect as of August 1, 1918; no increase to advance any individual salary to more than $200 per month or to apply in cases or to any extent where its application would result in an increase of more than $35 per month since January 1, 1918.

In cases where there has been no change in the salary rating from August 1, 1918, to December 31, 1918, the percentage increase here authorized will be applied to the total earnings for the period from August 1, 1918, to December 31, 1918.

For example: (A)

| | |
|---|---|
| Rate January 1, 1918, | $ 75.00 |
| Rate August 1, 1918 | 80.00 |
| Total earnings August 1, 1918 to December 31, 1918: | |
| Regular time, 5 months, | $400.00 |
| Overtime in five months | 20.00 |
| Total earnings | 420.00 |
| Retroactive compensation (if 10%) | 42.00 |

Example B:

| | |
|---|---|
| Rate January 1, 1918 | $75.00 |
| Rate August 1, 1918 | 105.00 |
| Because of previous increases the employees is entitled to only $5.00 per month increase, or 4.76% increase. | |
| Earnings—no overtime—no premium—no Sunday time: | |
| August 1 to December 31, 1918—time actually worked | $501.10 |
| Retroactive compensation—4.76% (Employee did not work full time) | 23.85 |
| Rate January 1, 1918 | 75.00 |

Example C:

| | |
|---|---|
| Rate August 1, 1919 | $75.00 |
| Rate October 1, 1918 | 85.00 |

| | Earnings Regular, Sunday and Overtime | Amount Would Have Been on Aug. 1, 1918 Rate | Retroactive Compensation if Based on 10% Increase |
|---|---|---|---|
| August, 1918 | $81.35 | $81.35 | $8.14 |
| September, 1918 | 87.33 | 87.33 | 8.73 |
| October, 1918 | 84.50 | 74.56* | 7.46 |
| November, 1918 | 92.27 | 81.41 | 8.14 |
| December, 1918 | 91.22 | 80.49 | 8.05 |
| | | | $40.52 |

$$\frac{*85.00}{75.00} = \frac{84.50}{74.56}$$

Example D:

The retroactive payments to employees at non-functional offices who are qualified as above shall be figured on the basis of their adjusted compensation since January 1, 1919, whether in the form of a percentage increase or payments for time worked in excess of eight hours, or both.

| | |
|---|---|
| No change in basic salary rate, but allowance for overtime; employee in service two years: | |
| Rate January 1, 1918 | $75.00 |
| Rate August 1, 1918 | 80.00 |
| Effective January 1, 1919, employee receives monthly salary of | $ 80.00 |
| One hour overtime in excess of 8 hours on $80 monthly (daily rate on 313 day basis is $3.07 and one hour daily per day)—27 working days—at 38c. an hour. | 10.26 |
| Two hours daily on Sundays (4 Sundays) | 3.04 |
| | $ 93.30 |
| Retroactive compensation $13.30 per month for five months | $ 66.50 |
| Adjustment on combined overtime and salary increase basis; employee in service two years: | |
| Rate January 1, 1918 | $ 50.00 |
| Rate August 1, 1918 | 65.00 |
| Effective January 1, 1919, employee receives ½ hour overtime in excess of | |

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| | |
|---|---|
| eight hours. As this does not result in 10% increase, to which employee is entitled, salary is increased to.... | $ 67.50 |
| Daily rate on new basis is $2.58 and ½ hour daily for January (27 working days at 32c. per hour) amounts to (no Sunday hours)..... | 4.32 |
| | $ 71.82 |
| Retroactive compensation $6.82 per month for five months ..... | $ 34.10 |

Although the original order was issued by the Postmaster General, the Western Union Company will make the payments out of its own fund. The amount of money involved is $916,500.00, and approximately 31,200 employees are affected.

## NEW YORK WESTERN UNION.

### Fifty Years in Service.

Arthur Vaughan Waldron, transmitter chief of the C. N. D. ticker system, 24 Walker Street, New York, celebrated the completion of fifty years' continuous service with the Western Union Telegraph Company, after "Good-night" on Saturday, July 5. His golden jubilee was the occasion for hundreds of hand shakes and messages of congratulation, testifying to the affectionate regard in which he is held by the fraternity.

Mr. Waldron's first experience in the telegraph field came at the age of ten, when he volunteered for the delivery of Confederate government messages at Augusta, Ga., under the direction of Mr. E. F. Ludwig, whose brother, D. J. Ludwig, was at the same time a Union telegrapher at Harpers Ferry. Arthur made good, and when E. F. Ludwig later became superintendent of the Western Union's commercial news department, at New York, he employed his former war messenger (July 6, 1869,) as runner in the delivery to subscribers of the foreign commercial and financial service of that department. Mr. Waldron's rise to the top in his chosen field was not long delayed. Early in 1870 he was placed in charge of the messengers; made financial ticker keyboard operator and equipment attendant in 1871, being the first operator to work the piano keyboard; promoted in 1873 to inspector of financial tickers; chief inspector in 1880, and chief operator in 1882.

Mr. Waldron was a pioneer in inaugurating the underground system in New York. It was his task in 1888 to remove all overhead ticker wires and place them underground without interruption to the service, after Mayor Grant had started his campaign against the overhead system. He was the first to suggest (in 1898) the use of the shift wire for a self-winding device on the Scott fast stock tickers. His idea was perfected a few years later by Mr Phelps, of Philadelphia. His generous nature and gallant spirit have endeared him to hosts of friends and, in spite of his long term of service, his activities continue unabated, and the felicitations universally accorded him carry with them the wish that he may have many years of useful endeavor still before him.

BUSINESS in the general operating room is unusually heavy, necessitating every member of the force giving the best that is in him to keep the traffic moving. It is remarkable with what facility the large volume of business is dispatched.

DENNY BROWN, of the testing and regulating department, main office, Washington, D. C., is on his vacation, and is visiting friends in New York and Boston.

### Telegraph Baseball League.

There have been some upsets in the competition for the Metropolitan Division championship of the Western Union Boys' Baseball League, and the clearing of the smoke shows the 3d District team on the top rung of the ladder, with the 2d District team, the former champions, in second place.

The games played since the last announcement in the TELEGRAPH AND TELEPHONE AGE, resulted as follows:

JUNE 29

4th Dist.—19; 1st Dist.—10 (Prospect Park)
3d Dist.—9; 2d Dist.—5 (Macombs' Dam Park)

JULY 6.

3d Dist.—17; 1st Dist.—7 (Van Cortlandt Park)
2d Dist. vs. 4th Dist.—Game called on account of rain.

*Standing of the Teams, Including Game on July 6.*

| | *Won.* | *Lost.* | *P.C.* |
|---|---|---|---|
| 3d District (North of 59 St.).. | 6 | 2 | .750 |
| 2d District (Canal St. to 59 St.) | 4 | 3 | .571 |
| 1st District (below Canal St.). | 3 | 5 | .375 |
| 4th District (Brooklyn)..... | 2 | 5 | .286 |

### Chicago Western Union.

JAMES LIPSEY, a member of our operating staff, formerly and for many years identified with the New York main office of this company, and well known in Gotham as well as in Chicago, was married a few days ago to Mrs. Louise W. Hall, of this city. Mr. and Mrs. Lipsey have the best wishes of their numerous friends.

FRANK J. WOLFE, long an employee of this office, died June 6 and was buried at Elmhurst, Ill., June 8.

A. O. HEBLUND, of this office died June 12.

GUTTA-PERCHA was first manufactured on a commercial scale in the United States by Samuel T. Thompson, in the year 1847. Thompson's factory was in Brooklyn, N. Y.

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## Associated Press Notes.

MELVILLE E. STONE, general manager of The Associated Press, has returned from Paris, where he assembled the peace conference staff, and until his departure in April, directed its work.

KENT COOPER, chief of the traffic department, will sail shortly for Europe to investigate transmission conditions. He will visit London, Paris, Rome and other bureau points. Mr. Cooper recently circled the South American continent to Rio Janeiro and came out with twenty-five new Associated Press members.

W. F. FLANAGAN, an old-time Associated Press telegrapher, but of recent years employed in the Editorial department of The Associated Press, has been appointed as one of the correspondents of the recently formed Associated Press bureau at Rio Janeiro. Mr. Flanagan left for his new assignment in May.

RALPH LYONS, another veteran Morse man, succeeded Mr. Flanagan as South American editor in the New York bureau of The Associated Press.

THE WIRES OF The Associated Press throughout the country were silent for one minute in memory of Theodore Roosevelt on January 8, the day of his funeral. Only once before, when President McKinley was buried, was such a tribute bestowed.

## Major E. R. McFarland Returns From France.

Major E. R. McFarland of the United States Signal Corps, formerly superintendent of the telegraph and telephone department of the Alaskan Engineering Commission, returned to Anchorage Alaska, from overseas service after an absence of 21 months, most of which were spent in and around the world-famed battlefields of France and Belgium.

Major McFarland left Anchorage, August 18, 1917, going to the Presidio of Monterey, where he successfully submitted himself to a mental and physical examination. From the Presidio he was sent to New York for embarkation to France as a captain in the Signal Corps of the American Expeditionary Forces. He arrived in France, October 6, 1917, and was promoted to major in September, 1918. His promotion gave him active charge as general superintendent of all telephone and telegraph lines on over 1700 miles of railroad in active operation. He left France, April 9, of this year, arriving in Anchorage, May 31.

During the time spent in France, Major McFarland traveled by motor car a distance of over 33,000 miles in the performance of his duties. He had occasion to visit practically all of the important base and supply camps throughout France and on several occasions while on detached service was in the front line trenches.

THE AMERICAN WIRE GAGE, was devised by J. R. Brown, of the firm of Brown and Sharpe, in the year 1857. Prior to that time the Birmingham wire gage was universally used.

## TELEGRAPHERS' STRIKE ENDED.

The strike of the members of the Commercial Telegraphers' Union of America, which was called against the Western Union Telegraph Company, and the Postal Telegraph-Cable Company, on June 11, was called off by President Konenkamp, of the Union, on July 2.

Shortly after the strike was called the Order of Railroad Telegraphers issued instructions to its members placing a ban upon the handling of commercial telegrams at railroad telegraph offices. On July 1, President Manion of the railroad telegraphers' union, raised the embargo. Failure of the commercial telegraphers' union to make the strike effective, and the railroad telegraphers' obligations to the public were the causes given of this action.

On June 27, Postmaster General Burleson, in a conference with representatives of the American Federation of Labor, refused to recede from his previously stated position, which he based upon the rules of the War Labor Board. Following this conference Mr. Burleson's office gave out the following statement:

"After a full hearing the Postmaster General informed the committee that the Wire Control Board had kept in close touch with the situation from the inception of the attempted strike, and had informed him that same was thoroughly without justification and was in palpable violation of the rules and regulations laid down by the War Labor Board. This body, the War Labor Board, was created to adjust controversies arising during the war period between private corporations and their employees.

The War Labor Board had, among other rules relating to telegraph companies, laid down the following:—

"1—That the Western Union would receive a committee of its own men who desired, individually or in a group, composed of the employees, to present requests for better conditions of labor as to hours, compensation and otherwise, and that if an agreement could not be reached the matter should be referred to this board and the question disposed of in accordance with the procedure provided for the board under the rules.

"2—That the Western Union should not be required in any way to deal with the union or to recognize it.

"3—That the Commercial Telegraphers' Union should agree with the National War Labor Board, and guarantee to it that in any effort by its members to secure better conditions of labor it would not itself initiate it and would not permit its members to use the strike, but that it would submit their grievances to the National War Labor Board, and abide by the decisions under its procedure.

"4—That if any employee of the Western Union Telegraph Company, a member of the Telegraphers' Union, should fail to conform with this agreement and to abide by the rules and principles of the board, the Western Union Telegraph Company might discharge such employee, and that the Na-

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tional War Labor Board would sustain such discharge.

"It has repeatedly been announced by the Wire Control Board that strikes on the part of employees while the wire systems were under the control of the government were not permissible. Whether the 276 of the 40,000 Western Union employees and the small number of employees of the Postal Telegraph Company who went on the strike are now to be taken back into the service of these companies is a matter resting with their managerial officers. These employees voluntarily left the service of the companies in violation of the rules of the War Labor Board and the Wire Control Board, and the Postmaster General will not direct their reemployment.

"The managerial officers of the telegraph companies report to me today that the traffic is being handled without delay, that their business is practically normal, that the machinery for handling grievances of employees is at this time functioning, and furthermore, that no denial has been made by either company of the right of its own employees to individual or collective bargaining in settlement of grievances."

KONENKAMP'S STATEMENT.

In calling off the strike the president of the telegraphers' union issued a statement which in part read:

"When the present strike was declared against the telegraph companies under control of the wire admininstration, it was understood that it would not be made an endurance contest. The strike was to be the final protest against the unfair and unjust treatment we have received since August, 1918, at the hands of the wire admininstration.

"We realized that in order to make this protest effective it would be necessary to make the strike sufficiently acute to compel action. This does not seem possible now either through our efforts or the effort of others we relied upon to help us.

"This is the view taken by many who are vitally interested in the success of the strike, and they agree with me that to submit the proposition to a vote of the membership would result in serious delay and disorganization. Acting upon this conclusion and with a view to serving your best interests, I hereby declare the strike at an end, and you are instructed to return to work without further delay.

"We are doubly unfortunate in having to deal with a government representative in the person of Mr. Burleson, who will yield no concession to the workers unless it is forced from him, and in not being able to muster enough strength within our own ranks to compel him to give us a square deal. Despite all of his high sounding words, the fact remains that Burleson has fought us and aided the telegraph companies at every turn, and his party must take the blame."

THE FIRST ELECTRIC CLOCKS were constructed by Hamblet, of Boston, in the year 1868.

## THE CABLE.

BY A RECENT DECISION of the Appellate Division of the Supreme Court of New York, cable companies may be taxed for the use of the land upon which their submarine cable lines are laid up to the three mile limit off shore. For the State of New York and the City of New York, it is said this decision will mean the assessing of additional taxes upon the cable companies of one million dollars per year.

L. G. SCHULTZ, of the Central and South American Telegraph Company, left New York July 5, for service at the company's office at Fisherman's Point, Guantanamo, Cuba.

### Pacific Cable Rates Reduced.

On and after September 1, 1919, the cable rates between San Francisco and Manila will be reduced by the Commercial Pacific Cable Company from $1.00 per word to eigthy cents per word. The company will also make reductions of approximately 20 per cent. in the rates to China and Japan, effective the same date. The new rates to Japan and China will be announced as soon as the Commercial Pacific Cable Company is able to ascertain what reductions these foreign governments will make in their terminal charges.

### Cable Staff Changes.

In the service of the Eastern Telegraph Company the following staff movements have taken place: C. W. Simpson, D. Bailey, C. H. Hawthorne, W. L. Wadham, R. E. Parsonage, H. R. Hughes, G. E. Stonham, E. W. Garrett, H. B. Challacombe and A. H. Pearce, to Alexandria; C. J. Burrows and H. E. Trangmar, to Marseilles; G. Gibbon and R. W. Hopkins to Fayal; R. Martin to Port Said; H. L. Brett and E. G. McMurdo to Suez; E. J. Courtney and V. P. Payne to Malta; R. H. Fletcher and G. B. King to Mozambique; J. C. Couch to Zanzibar; E. Richards and J. G. Richards to Durban; C. Baxter, E. Vautier, W. F. Rice, and A. G. Whittley to Aden; A. L. Spalding to Bombay, and M. Webber to Delagoa Bay.

Staff transfers in the service of the Western Telegraph Company are: W. Humphreys to Montevido; C. H. Beck to St. Vincent; A. C. Abbott, H. E. Bristowe, and G. N. Ray to Rio de Janeiro; S. A. Brooks, and G. V. Swiggs to Valparaiso; F. A. Wightman and E. H. Deadman to Pernambuco; A. G. Douglas to Santos; J. S. E. Clancy, E. H. Wallers, J. N. R. Rutter, W. J. Stratton, F. G. Hammonds, L. J. Pratt and G. W. Claraut to Madeira; and J. E. Hales to Buenos Aires.

In the service of the Pacific Cable Board the following staff movements have taken place: L. J. Lacey and H. B. Freeman to Suva; J. W. Turnbull to Southport; H. R. Thurston to Auckland, and S. Black to Montreal.

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## New Cable to South America.

Plans have been announced of the laying of a new cable between the United States and Brazil, and thence down the east coast of South America. The necessary arrangements have been completed by the Western Union Telegraph Company and the Western Telegraph Company of Great Britain.

Laying of 3,200 miles of new cable, which may be accomplished within six months, will connect Miami, Fla., with Belem, Brazil, by way of Barbados, the termini of the new system meeting the Western Union land lines at Miami and the coastal cables of the British company extending from Belem to Rio Janeiro, Buenos Aires, and the principal cities of South America's eastern seaboard.

Although the contract between the Western Union and the Western Telegraph Company for mutual operation of the new service has not yet been signed, Newcomb Carlton, President of the Western Union Company states that he believes it will be in the near future. The Western Union, he added, already had an option on materials required for its part of the construction undertaking, from Miami to Barbados, the British concern having arranged to extend its South American lines from Belem to Barbados.

Mr. Carlton said it had been decided to route the Western Union link in the intercontinental cable direct from Florida to Barbados instead of utilizing the present line to Cuba in order to provide service without delay between the two Americas.

Completion of the new line, he said, not only would bring the United States in wire contact with eastern South America, but by utilizing overland and cable routes already in operation would provide communication also with the Western South American coast cities.

While the Western Union has a concession from the Brazilian government permitting laying of a cable from Rio Janeiro along the eastern and northern coast line, Mr. Carlton declared the arrangement with the British cable owners, which would guarantee non-discriminatory service to America, offered a prompter and more economical means of instituting the North and South American connection. He said that no decision had been reached as to disposition of the concession.

Construction of the Miami-Belem line will be about evenly divided between the American and the British companies, each taking practically 1,600 miles. The American lines will skirt the northern shores of Cuba and Haiti, thence, following the passage between Haiti and Porto Rico and running direct to Barbados. Mr. Carlton said the Western Union was ready to proceed with construction as soon as the contract with the overseas corporation was signed.

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THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE was organized in the year 1847. The predecessor of this association was the Association of American Geologists and Naturalists, which held its first meeting in the year 1840.

## RADIO TELEGRAPHY.

CUTTING AND WASHINGTON, manufacturers of radio apparatus, have established offices, factory and a research laboratory at Nos. 6 and 8 West 48th Street, New York. J. P. Johnston is general manager of the company.

The company's headquarters formerly was at Cambridge, Mass.

O. B. MOOREHEAD, of the Moorehead Laboratories, San Francisco, is in New York, calling upon the Marconi, De Forest, Shaw Manufacturing Company, and other interests in connection with vacuum tubes and lamps. While in the east Mr. Moorehead will visit Washington in connection with government work.

IN VIEW OF the growing importance of radio telegraphy, telegraph, submarine cable, and telephone engineers, wire chiefs and students should plan to join the Institute of Radio Engineers, in order to receive the regular technical publications of the Institute. thereby keeping abreast of the times. Those who desire to become members should communicate with Donald McNicol, editor of TELEGRAPH AND TELEPHONE AGE, and application forms will be sent them.

LEONARD F. FULLER, chief electrical engineer of the Federal Telegraph Company, San Francisco, has resigned to become assistant manager of the Ohio Insulator Company, with headquarters at Barberton, Ohio. Mr. Fuller has been associated with the Federal Telegraph Company during the period in which the Poulsen arc has taken a leading place in long-range radio communication, and much of the improvement in recent years contributing to their success is attributed to him. Mr. Fuller recently received the degree of Ph.D. from the Stanford University for his work in magnetic circuits in arc generators.

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## New Radio Call Book.

The Consolidated Radio Call Book, which contains 2,500 calls in addition to those listed in the Berne Bureau's call book of April 1918, is now ready for distribution. The book will be of great value both to the amateur as well as the professional radio operator. In addition to the complete list of radio ship and shore station calls of all nations the book contains a large amount of information relative to radio traffic handling, rates, etc. Copies may be purchased from TELEGRAPH AND TELEPHONE AGE, at 75 cents per copy.

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## Reliable Amateur Apparatus.

Amateurs who are planning upon making their own apparatus should select parts that are standard and interchangeable. A. H. Corwin & Co., 924 Kinney Building, Newark, N J., will forward their catalog of radio parts for five cents in stamps.

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# Wireless Telephone Transmitter for Seaplanes

Marked progress in the perfection of airplane wireless telegraph and telephone apparatus is a direct result of exhaustive researches in radio communication which have been conducted during the past two years. Light weight transmitters having a sending range of 150 miles or more have been developed. Spark apparatus has been employed to a considerable extent in airplane communication, but transmitters utilizing the vacuum tube oscillator have the advantage of permitting either speech transmission or telegraphic signals by damped or undamped oscillations, at the will of the operator.

Practical wireless telephone apparatus of the vacuum tube type is disclosed in the following description of the Marconi type S.E. 1100 set—a comparatively high power bulb transmitter—developed by the Marconi Wireless Telegraph Company of America.

The set was designed primarily for the large flying boats, the H-16 class, of the United States Navy, and has fully satisfied every test to which it has been put. In one of the earlier tests in flight over Chesapeake Bay, telegraph signals radiated from a trailing antenna on an H-16 boat were heard distinctly in Washington, D. C., over a distance of 120 nautical miles. Subsequent tests with the set used as a wireless telephone permitted the accurate transmission of speech over a distance of 150 miles. The transmitter radiates at two wave lengths 1600 and 600 meters. For the former wave length a trailing wire antenna of .0004 mfd. is employed; for the latter, an emergency aerial of .00026 mfd.

The transmitter is supplied with two 3-electrode tubes of the pliotron type. One tube is employed as an oscillator for the production of radio frequency currents and the other as a modulator and amplifier of the voice currents communicated to it by the microphone.

The fundamental circuits of the set are shown in Fig. 1, the actual circuit in Fig. 2, and a wiring diagram showing the function of the change-over switches in Fig. 3. An installation sketch is shown in Fig. 4.

### DESCRIPTION OF THE CIRCUITS

For best understanding of the operation of the apparatus, it should first be appreciated that if the grid and plate circuits of a vacuum tube include radio frequency circuits coupled inductively, conductively or electrostatically, alternating currents of any desired frequency may be generated. This is the first requisite; other problems, such as rapid change of wave length, satisfactory modulation, and the elimination of disturbing capacities between circuits, arise in the practical set, and are of equal importance. They were satisfactorily solved only after diligent research.

In order to set valve circuits into a state of radio frequency oscillation, it is necessary that the connections be so made that the grid end of the grid inductance will be alternately negative and positive as the plate end of the plate inductance is positive and negative. When the grid and plate radio frequency circuits are coupled with the proper phase relation, any variation of voltage in either the grid or plate circuits will cause minute disturbance in the oscillation circuits, setting them into oscillation at whatever freqency they happen to be adjusted to. For example, a slight variation of voltage in the plate circuit by any means whatsoever, will cause its resonant circuit to oscillate at radio frequency, and the resultant currents will act upon the grid circuit, setting it into oscillation at the same frequency. The resulting radio frequency fluctuations of the grid potential will act upon the plate at the right time to keep the plate resonance circuit in a state of oscillation, and this state of affairs will continue so long as the proper supply of voltage and filament current is maintained, but not otherwise.

The tube is able to generate alternating currents because of its amplifying properties. The energy delivered to the grid circuit in accordance with the actions, just outlined will gradually increase in value until a maximum is reached, which is the maximum output the valve is capable of delivering, as may be discerned from the well-known characteristic curve.

Referring to Fig. 1, it will be observed that the plate and grid circuits of the tube contain the coils L-1 and L-2, in inductive relation, each connected through the condensers C-3 and C-4 to the negative side of the filament. The grid oscillating circuit comprises the coil L-2, the condenser C-2 and a protective condenser C-4. The plate oscillating circuit includes the condenser C-3, a part of the coil L-1 and the series condenser C-5. The antenna and earth connections tapped off from the coil L-1 take the place of the condenser C-2 in the grid oscillating circuit. C-2 is called the balancing condenser. In series with the grid is another condenser C-8 shunted by a leak resistance R-1, which maintains the grid at a negative potential.

The system further includes a three electrode tube F′, G′, P′ which amplifies the output of the microphone circuit and simultaneously modulates the output currents of the oscillating bulb.

It will be noted that the plate circuit is fed by a 1500 volt DC generator G-2, the positive terminal of which connects to the plate P of the oscillating tube through the audio frequency inductance or transformer L-3 and the radio frequency inductance L-4. The negative side of the generator connects through the milliammeter A-1 to the negative side of the filament F. The condenser C-5 is the

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protective condenser which is generally employed in tube oscillating circuits when the source to the plate circuit is connected in shunt to the plate and to the filament, as is the case in this circuit. The modulating circuit shown to the right of the drawing permits either voice transmission or telegraphy by damped oscillations.

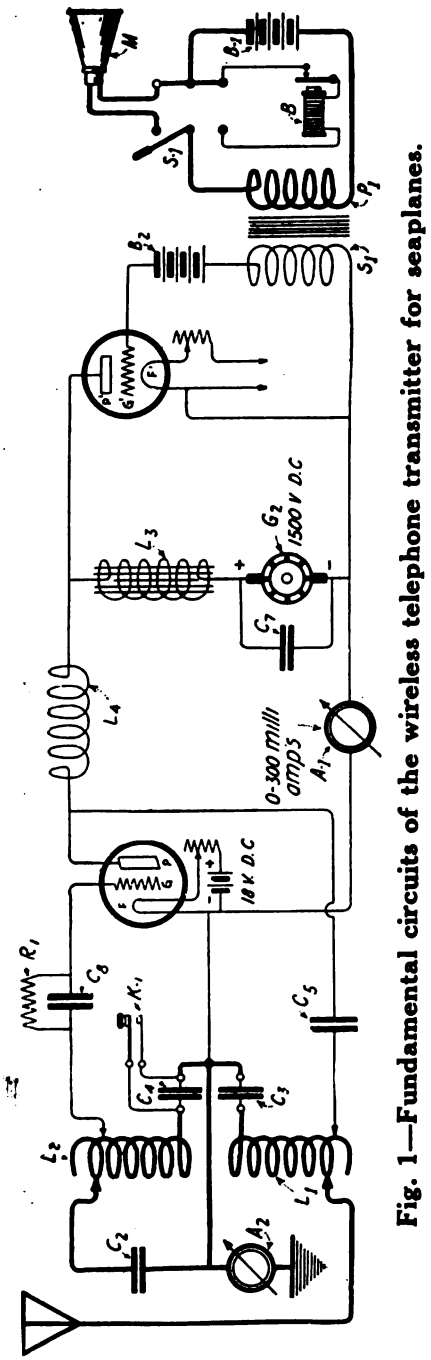


Fig. 1—Fundamental circuits of the wireless telephone transmitter for seaplanes.

CIRCUITS FOR WIRELESS TELEPHONY

For telephony, the microphone M is placed in series with the telephone induction coil P-1, S-1, and the battery B-1, by means of the switch S-1. The coil S-1 is connected to the grid and filament of the modulating tube, and includes in its circuit the battery B-2 through which the grid is held at a suitable negative potential for maximum magnification. The filament and plate of the modulating tube are shunted across the plate circuit of the oscillating tube. The audio frequency choke L-1 may be said to act as a one to one transformer. The radio frequency choke L-4 prevents the radio frequency currents developed by the oscillator from flowing back to the plate circuit generator G. C-7 is a protective condenser for the plate circuit generator.

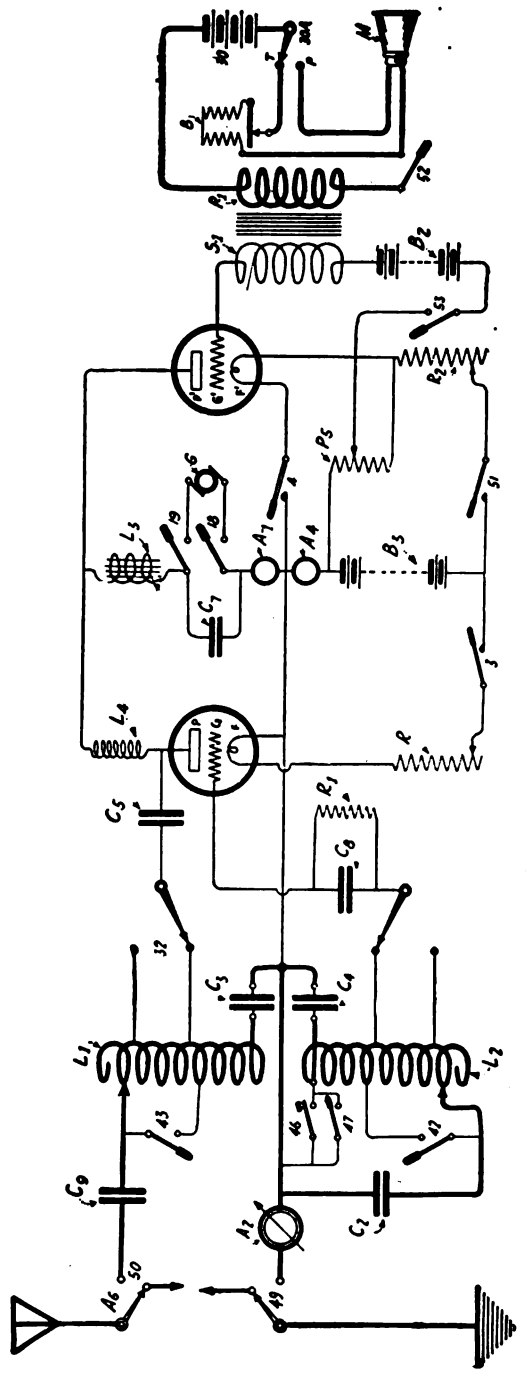


Fig. 2—The actual circuit used in practice.

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When the transmitter M is spoken into, speech currents of variable frequencies generated by the microphone are impressed upon the grid circuit of the modulating tube and, through the medium of the auto transformer L-3, alternating currents are superposed upon the plate circuit of the oscillator. This in turn varies the amplitude of the oscillator currents at speech frequencies, and accordingly the amplitude of the radio frequency oscillations flowing in the antenna circuit. It is essential that the key K-1 of Fig. 1 be closed for the production of undamped oscillations, for when it is open the tube stops oscillating. Manipulation of this key permits telegraphic signaling by the undamped oscillations produced by the tube.

### TELEGRAPHY BY DAMPED OSCILLATIONS

When it is desired to telegraph by damped oscillations, the change over switch S-1 is thrown from the microphone to the buzzer B which is energized by the battery B-1. The interrupted currents fed by the buzzer through the primary P-1 of the induction coil produce alternating currents of higher voltages in the coil S-1, which in turn are magnified by the modulating tube, the latter varying the radio frequency currents in the oscillator tube at the frequency of the buzzer. In this way, the antenna radiates damped oscillations in groups, the frequency of the groups varying as the number of interruptions of the buzzer.

A more detailed circuit of the Marconi aircraft set appears in Fig. 2. This diagram not only embraces the fundamental connections of Fig. 1, but includes all necessary switches for the three different signaling functions on the 600 and 1600 meter wave. It includes, moreover, a detailed wiring diagram of the filament circuits.

### DETAILS OF THE FILAMENT CIRCUIT

The filament circuit divides at the positive terminal of the 24 volt storage battery B-3, one branch going through the rheostat R-1 to the filament F of the oscillating valve, and the other going through the rheostat R-2 to the filament F′ of the modulating valve. The negative sides of the two filaments are connected together and to ground. In addition there is provided a potentiometer P-5 connected across the battery B-3 with a tap leading to the negative potential battery B-2 and on through the secondary of the microphone transformer S-1 to the grid G′.

The object of the potentiometer in Fig. 2 is to compensate for any loss of negative potential in the grid circuit G′, which may be occasioned by the lowering of the voltage of the filament battery B-1.

The switches for shifting the connections from one system of signaling to the other are enclosed in drums; the schematic diagram of these is shown in Fig. 3. The inside and outside rows of jaws on each set are represented by the upper and lower

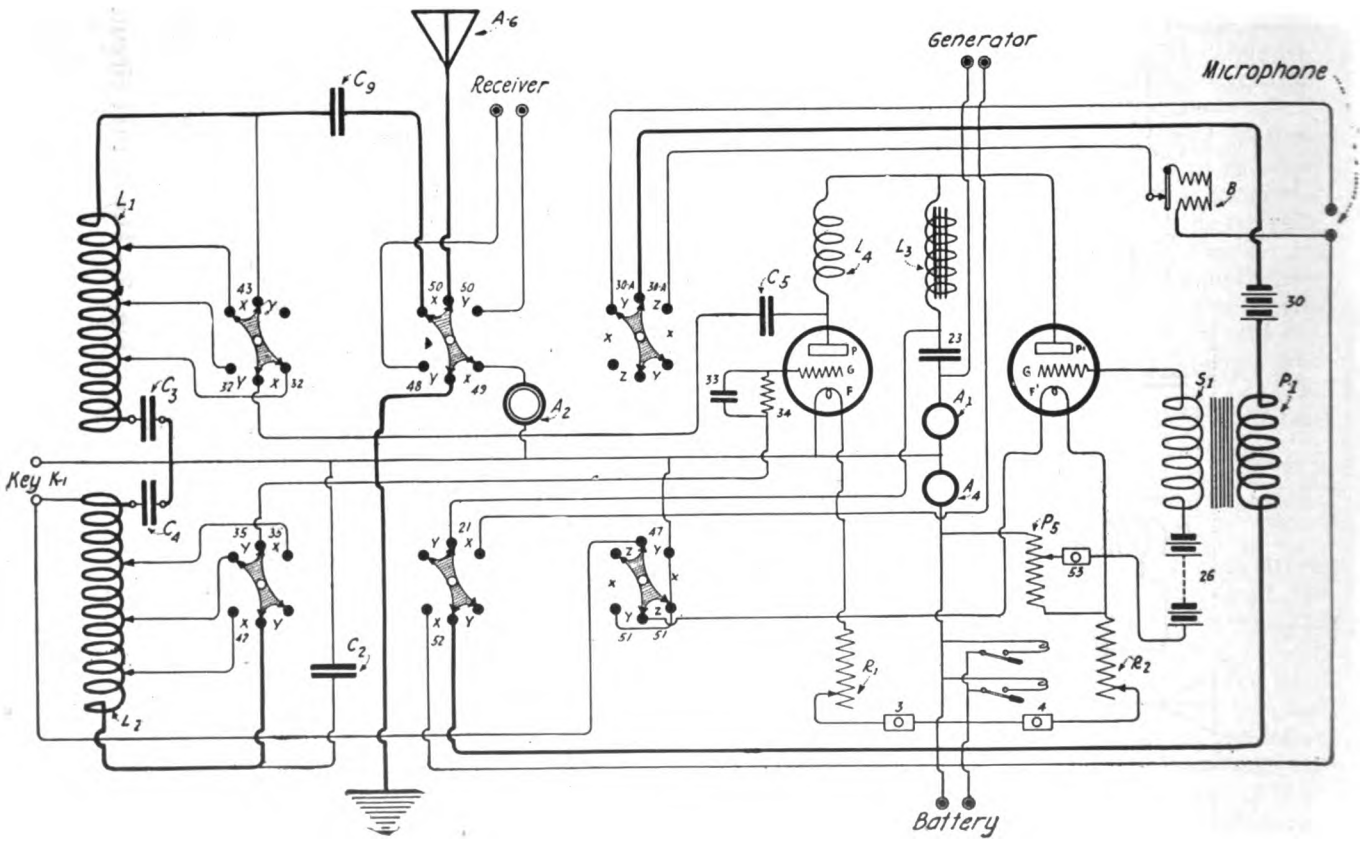


**Fig. 3—Wiring diagram showing the function of the change-over switches.**

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group of dots in Fig. 3. In that figure the left hand pair constitute the wave length changing switch, the middle pair, the sending and receiving switch and the right hand pair, the signal switch. The first, second and third positions of each switch are indicated by the letters X, Y and Z, these letters being placed between the two points which the blades of the switch short circuit in that position. Regarding the action of the oscillating valve itself: When the grid is negative in respect to the filament, no current passes between the grid and filament; but when it is positive, considerable current passes which constitutes a loss in the circuit; but if the grid is held at a constant negative potential this energy loss is reduced and a more effective transmitter is obtained. The grid potential may be held at a negative value by the insertion of a grid battery but it can be done in just as effective a way by inserting a condenser in the grid circuit which rectifies the grid currents and holds the grid at a negative potential.

If the leak were not provided, the potential of the grid would rise to such a high negative value that all action would be stopped. A leak of proper value definitely limits the maximum negative potential of the grid and therefore does away with the necessity for a special grid battery.

### CHANGE-OVER SWITCHES

The numbers on the separate single pole switches in Fig. 3 correspond with those shown in Fig. 2. The outside row of studs on the wave length changing switch perform the following functions: In the 600 meter position (X at 32 in Fig. 2) the first tap on the upper section of the loading coil L-1 is connected to the plate series condenser C-5, and at 43 short circuits the end portion of the same coil. In the 1600 meter position Y, it connects at 32 the second tap of the coil to the condenser and opens the short circuit.

The inside row of studs on the wave length changing switch performs the same functions for the coil L-2, which is the lower portion of the long single coil mounted in the middle of the rear of the panel in the accompanying photograph. In the schematic diagram, Fig. 3, the blade marked 35 is shown connecting to the first tap of the lower portion of the coil in the 600 meter position, and to the second tap in the 1600 meter position to the grid condenser C-8 with its leak resistance R-1. The actual wiring of the set differs slightly from this, for it was found that the same tap of the coil was correct for both wave lengths. For this reason, there are but two taps on the lower portion of the coil. The first of these is coupled directly to the grid condenser, C-8 and does not go through the wave length switch. The blade marked 42 short circuits one end of the coil L-2 in the 600 meter position and removes the short circuit in the 1,600 meter position.

The outside portion of the switch marked "send-receive" in the upper central position of Fig. 3 serves to connect the antenna A-6 to the transmitter in the "send" position (X) and to the receiver in the "receive" position (Y). In the "send" position the circuit of the antenna at 50 is through the series condenser C-9 to the top of the loading coil L-1 and to the ground. The latter is connected at 49 through the antenna ammeter A-2 to the main ground bus of the set which is the frame.

The inside portion of the "send-receive" switch, in the lower part of Fig. 3, is idle in the "receive" position Y, but in the "send" position X at 21, it completes the 1500 volt direct current supply current to the plates P and P-1 of the pliotrons. At 52 it connects the primary of the microphone transformer P-1 to the microphone terminals 28 and to the buzzer B. These connections are opened in the "receive" position.

There are three positions for the signal switch. The first, X, is for continuous wave telegraphy. In this position the connections made in the second and third positions are opened. The second position Y is for telephony; the inside portion of the switch (the upper part in Fig. 3) connects the microphone to the microphone battery, and at 51 the outside portion (in the lower part of Fig. 3) completes the filament circuit for the modulating valve and short circuits the key at 47. In the third position, the switch connects at 30 A the buzzer to the microphone battery and at 51 keeps the filament of the modulating valve lighted, removing the short circuit from the key.

The position of the switches in Fig. 3 does not correspond with their location on the set. All three switches are built to stand a maximum of 10,000 volts high frequency potential, although the potentials developed in the apparatus are considerably lower.

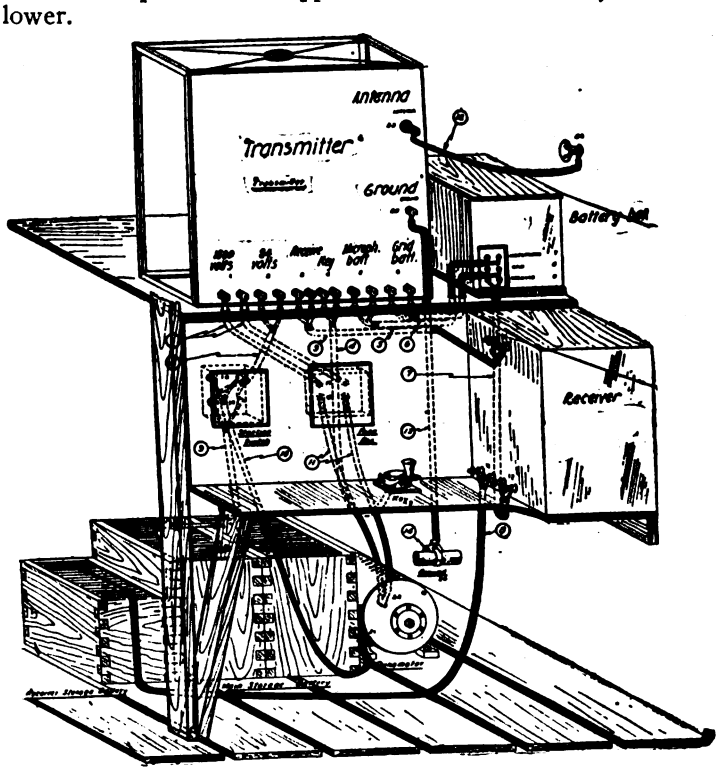


**Fig. 4—Sketch showing the installation of the complete set.**

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METERS AND THEIR FUNCTIONS

Space and weight considerations demand the fewest possible measuring instruments. A direct current ammeter A-4 is connected in series with two filaments and reads the total current taken by both of them. The instrument's scale registers from zero to 19 amperes; to read the current in either filament it is merely necessary to cut out the other one. This may be done by means of two small switches marked on the set "oscillator filament" and "modulator filament."

The principal indicator for checking up the proper operating conditions of the set is the plate current drawn by each of the valves from the dynamotor, the voltage of which, as already mentioned, is 1500 volts. This reading is obtained from the plate current ammeter A-1 of figure 2, connected in the ground leg of the supply circuit. This instrument reads from zero to 300 milliamperes and measures the total plate current taken by the oscillator and modulator. The maximum voltage developed by the dynamotor is 1600 volts and the vacuum tube generally will cease to operate when it falls below 1100 volts. The generating tube will oscillate over a wide range of plate voltages if the filament current is kept below a certain critical value. The filaments of the pliotrons are designed to operate on 18 volts.

POWER SUPPLY

The primary source of energy is two 12 volt, 50 ampere hour batteries of the lead type similar to those used in automobile starters. The filaments of the two pliotrons are operated through a rheostat directly from the 24-volt storage battery. Since the tubes require a plate E.M.F. of 1,500 volts direct current, a small dynamotor, driven by the 24-volt storage battery, is supplied. The armature has two windings in the same slots, one connected to the 24-volt commutator at one end, and the other to the 1,500-volt commutator at the opposite end. It is a two-pole machine excited from the 24-volt source. The armature, which runs on ball bearings at 5,000 r.p.m. and draws about 30 amperes on its full load at 450 watts, weighs approximately 30 pounds.

In addition to the 24-volt storage battery, three other batteries are required; two for the transmitter and one for the receiver. These three sets are known as the microphone battery, grid battery and receiver battery. The voltage of the first is 5; of the second 60, and of the third 40. The 60- and 40-volt sets consist of 20-volt units connected in series. They are arranged in a wooden box screwed to the operating shelf.

THE SUPPORT OF THE PLIOTRONS

To insure against breakage, the best position for the pliotrons is vertical with the large neck at the bottom. This brings the plate terminal cap at the top and the filament and grid terminal cap at the bottom.

REEL ANTENNA AND ACCESSORIES

The antenna reel group for this set consists of the reel mechanism, a removable drum with antenna wire and spare drums with complete antennae on them. The wire from the reel runs through a take-off pulley and passes through the lead-in insulator in the side of the hull of the boat. It then passes through either a strut pulley or wing pulley, depending upon the type of the boat.

REEL MECHANISM

A cast aluminum plate, clamped to one of the main struts in the hull of the boat, carries a shaft on which the drum turns. On this same shaft, next to the attachment plate, there is a brake drum of cast aluminum, and around this drum a cast brake band. The band is sprung over the drum and prevents it from turning except when a cam which is attached to the brake lever springs it open. A pin on the brake drum engages holes in the main drum, when the latter is put on the shaft. The crank by which the main drum is turned has a square hub on which the drum sets. It is slipped onto the shaft, and latches in place. The latch is released by a latch handle just behind the arm of the crank. To remove the drum, to put a new one in place, the operator grasps the arm of the crank, and in so doing also grasps the latch handle and releases the latch. He then pulls the crank and drum off together. One drum may then be slipped off the hub of the crank and a new one put on, and the two slipped back onto the shaft.

REEL DRUM AND ANTENNA

The drum is a pressed steel spool, black japanned, and will hold about 600 feet of the standard antenna wire. It has a square hole at its center which fits the hub of the crank. The antenna wire has a ball at the reel end, and this ball is dropped through a hole in the drum face. The other end of the wire is attached to a swivel, and this in turn is attached to the "fish" or weight.

LEAD-IN INSULATOR

The lead-in insulator is a moulded "electrose" fitting, with a metal tube running through it, and a wide flare at either end, so that the wire cannot catch on the ends of the tube even if it enters at right angles. The insulator is held by lock-nuts in a hole in the side of the hull. The antenna connection from the set is brought to this insulator. When the antenna is out, the ball on the reel end of the wire rests against the inside flare of the insulator. The wire is thus entirely disconnected from the reel, and the reel is dead. When it becomes necessary to reel up, the ball is grasped, and of course brings the wire with it. The ball is passed through the take-off pulley and dropped through the hole in the drum face, and the crank is turned. The brake mechanism is arranged so that the cam may be left holding the brake off during the reeling up process.

Figure 4 shows the position of the receiving storage battery, the main storage battery transmitter, transmitting key, receiver, and battery box.

The maximum antenna current is 2.5 amperes, with the antenna supplied with the set. This has been found to satisfy all ordinary distance requirements.

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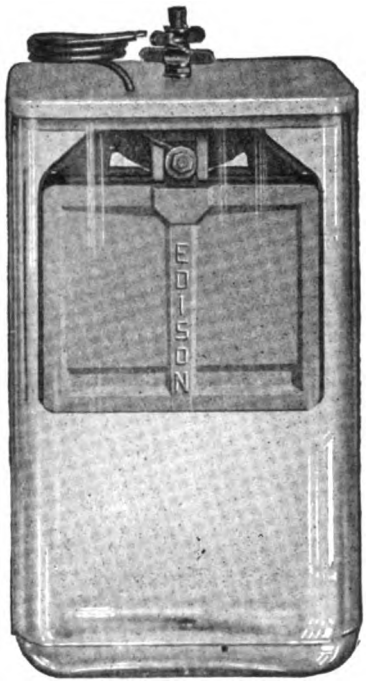
# FOR CLEAR TRANSMISSION




EDISON PRIMARY BATTERY DIVISION

THOS. A. EDISON, INC.

BLOOMFIELD, N. J.

# HALL SWITCH & SIGNAL CO.

**GARWOOD, N. J.** **CHICAGO**

*MANUFACTURERS OF THE*

## *GILL SELECTOR*

**THE UNIVERSAL SELECTOR FOR TELEGRAPH AND TELEPHONE**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## INDUSTRIAL.

### French Market for Electrical Goods.

Prior to the war a considerable amount of electrical goods was imported from Germany by French dealers in competition with other dealers handling French-made goods. It is thought that most of the inquiries in this line now come from the former class of dealers, who have lost their connections and who, naturally, have no claim on French manufacturers already represented.

American underwriters' standards are not necessary in France. The French houses are more nearly fireproof than American houses and the same precautions do not have to be taken. American dealers exporting to France will have to furnish French patterns in several fittings that differ essentially from American practice. Among the more common instances will be: Bayonet sockets instead of screw sockets, tumbler switches instead of snap switches, sheet metal tube with crimped joint and lined with treated paper instead of heavy metal conduit. This light conduit employs sleeve unions instead of screwed joints.

There have been inquiries regarding the conduit mentioned above, which is scarce in France at present. Other inquiries refer to: Multipolar snap switches, flush-type push-button switches, all fittings requiring hard rubber in their manufacture, high candlepower low volt incandescent lamps for motion picture machines.

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THE C-Y ENGINEERING COMPANY, C. W. Yerbury, manager, of Newark, N. J., has taken over the business of C. C. McIntyre, for many years manufacturer of high grade connectors and electrical specialties. Mr. Yerbury aims to maintain the high standards in manufacture maintained by the McIntyre Company.

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### Baseball Takes Back Its Own.

HOME PLATE FOR THE SOLDIER.

Baseball magnates have not needed the urge of the War Department to take back men discharged from the service. There wasn't a big league team that didn't have from five to ten men in the army or navy, and some of the teams had over a dozen. Brooklyn had eight. The New York Giants had an even ten, and the Phillies had a baker's dozen and one additional man with the Knights of Columbus.

A great majority of the men have already rejoined their teams, and the rest, managers announce, are being taken back as quickly as their discharge papers are being signed. Most of them are coming back with increased physical and mental power, with greater steadiness and less tendency to being rattled when in a tight fix. Private employers who are alert will not miss the opportunity to hire service men while the hiring is still good.

Colonel Arthur Woods, Assistant to the Secretary of War, predicts that there will soon be a shortage of labor instead of a surplus. Wise employers are already insuring themselves against that contingency.

## THE TELEPHONE.

A. C. STANNARD, on May 15, was appointed general superintendent of traffic of the Chesapeake and Potomac Telephone Company, with headquarters in Baltimore, Md.

Mr. Stannard is a traffic man of wide experience, having entered the service nearly 20 years ago, and having seen service in both operating and traffic engineering with the New England Telephone and Telegraph Company, the Southern Bell Telephone Company, the American Telephone and Telegraph Company and the Pacific Telephone and Telegraph Company.

F. L. DEVEREUX, of New York, formerly auditor of the Long Lines Department of the American Telephone and Telegraph Company, has been appointed general auditor of the Northwestern group of Bell Telephone Companies, with headquarters at Omaha, Neb.

W. A. PIXLEY, general auditor of the Nebraska Telephone company and of the other companies of the Bell group having their headquarters in Omaha, Neb., has resigned and will devote his entire time to the Truck and Tractor Corporation of Omaha, of which company he is vice-president and general manager.

COLONEL BEHN, president of the Cuban Telephone Company states that there will be direct telephone service between the United States and Cuba before Christmas of this year. The first link in the system is to be a submarine cable from Key West to Havana, which, by the way, will be the longest cable of its kind in the world, surpassing in length the submarine cable across the English channel. This cable is to be laid in the next few months; it is the first great step in linking all of the Greater Antilles with the continent.

A. B. ELIAS has been appointed second vice-president of the Southwestern Bell Telephone System, with headquarters at St. Louis; E. F. Carter has been appointed general manager, with headquarters at Dallas, Tex.; and R. J. Benzel has been appointed general manager of the Kansas Division, with headquarters at Topeka, Kan.

CASPER E. YOST, president of the Nebraska Telephone Company, the Iowa Telephone Company and the Northwestern Telephone Company, has resigned from the presidency of the three companies and has been made chairman of the board. He was succeeded by Vice-President W. B. T. Belt.

CHARLES S. PIERCE has been appointed general counsel of the New England Telephone and Telegraph Company.

TELEPHONE operators in Egypt are required to speak five languages—English, French, Italian, Greek, and Arabic.

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## Market for Telephone Equipment in Southern Brazil.

The greater part of the telephone lines of the State of Rio Grande do Sul is now owned and controlled by one company, which has its headquarters in Porto Alegre. A great deal of the equipment now in use was purchased in Germany, but gradually the company is buying modern material from the United States. The three largest cities in the State—Porto Alegre, Pelotas, and Rio Grande—are all equipped with German (Siemens-Halsger) switchboards which are now about worn out. At Porto Alegre the central battery system is used, without hand ringing, and at Pelotas and Rio Grande, as well as at all other points, the subscribers ring by hand, and the induction system is in use. Besides the German switchboards in use in the three larger cities, there are installed in some of the smaller towns various makes of switchboards, some American and some Swedish. The capacity of the Porto Alegre board is 10,000 lines, and there are 5,000 subscribers; the Pelotas switchboard has a 5,000-line capacity, and there are 2,000 subscribers; and the Rio Grande switchboard has a capacity of 2,000 lines with 500 subscribers at present. Other cities such as Bage, Caxias, Santa Cruz, Sao Leopoldo, and Cachoeira have subscribers in smaller numbers, and the total for the entire State is important.

The company is at present making plans for the installation of automatic telephones in Porto Alegre, and when this is effected the material replaced by the more modern equipment will be transferred to the smaller cities.

[The name of the leading telephone company of Rio Grande do Sul and of the merchants of Porto Alegre who import telephones may be secured from the Bureau of Foreign and Domestic Commerce or its district and co-operative offices. Refer to file No. 119676.]

## Word Counters.

Every enterprising telegrapher has need of a good word counter. It verifies the check and materially lessens the work of the receiving operator.

The PREMIUM word counter counts to 50 and fulfills every requirement on the fast bonus circuits. The Premium word counter is instantly attached to any Underwood typewriter. The price of this word counter is $6.00, carrying charges prepaid.

The HUDSON word counter counts up to 1,500 and is admirably adapted for press work as well as messages. This word counter has been on the market for over twenty years and has stood the test of time. Some of the original Hudson word counters are still in every-day use, which testifies in the strongest terms to their value and lasting qualities. The Hudson word counter costs $6.00.

Be sure to mention the make of typewriter, when ordering, as attachments differ.

Send orders and make remittances by express or post office money order to TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

## Telegraph and Telephone Life Insurance Association.

N. M. Giffen, secretary of the Telegraph and Telephone Life Insurance Association, under date of June 23, sent out the following notice to all members:

The following proposed amendment to section 14 of the by-laws has been regularly presented to the executive committee in accordance with article seven of the constitution. This change enables us to conform to the new insurance law which goes into effect, January 1, 1920.

The annual meeting held March 12, 1919, and which was adjourned subject to call of the chair will reconvene, September 23, 1919, to consider the adoption of the proposed amendment to the by-laws as noted below, and any other business that may properly come before the meeting.

"Paragraph five, section fourteen of the by-laws"

PRESENT

Whenever the sum collectible on account of assessments levied in any one year, less the expenses authorized, as hereinafter provided, to be incurred during said year, shall be equal to one and three quarters per cent (1¾%) of the total contingent mortuary liability, no further assessments shall be levied during said year; and in the event that the proportion of said sum applicable to the payment of mortuary claims shall not be sufficient to pay all mortuary claims incurred during said year, any balance necessary to meet said claims shall be withdrawn from the Reserve Fund and used to pay said claims.

PROPOSED

Whenever the sum collectible on account of assessments levied in any one year, less the expenses authorized, as hereinafter provided, to be incurred during said year, shall not be sufficient to pay all mortuary claims incurred during said year, any balance necessary to meet said claims shall be withdrawn from the Reserve Fund and used to pay said claims, but extra assessments shall be levied, whenever necessary to maintain said Reserve Fund as hereinbefore provided.

## Fuse Replacement Costs One-Half Million Dollars Annually.

William M. Bailey, manager of the Home Telephone Company, Richmond, Ind., in a paper read before the Convention of the United States Independent Telephone Association, held in Chicago, June 24, dealing with the subject of protection of telephone lines against lightning and other disturbances, said: "In this country we are spending nearly one half million dollars annually for the replacement of fuses, and I believe we can state with some degree of assurance that from 80 to 90 per cent. of these fuses are destroyed by lightning." Mr. Bailey further stated his belief that this condition can be very materially bettered by improving the design of protective equipment.

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# Universal Duplex Apparatus

## In Use By the Western Union Telegraph Company

### GENERAL

The Universal duplex repeater comprises the apparatus necessary for repeating signals from one telegraph line to another when each of those lines is operated by the polar duplex method.

Any two terminal duplex sets in the same office might be connected together to form a repeater, but the indirect repetition obtained through the ordinary local circuits in that way is somewhat inefficient and should generally be used only in temporary combinations of key-worked circuits. For all high speed circuits and for all regular assignments of key-worked circuits requiring repeaters, the Universal duplex repeater should be used.

The term "Universal" is applied to the repeater because of its adapatability to all classes of polar duplex repetition in this company's service. The various classes of duplex service obtainable by means of the Universal duplex repeater are as follows:

(a) Differential polar duplex repetition;
(b) Bridge polar duplex repetition;
(c) Differential polar duplex on one side repeating into bridge polar duplex on the other;
(d) Differential or bridge polar duplex repetition with intermediate station at the repeater point;
(e) Two terminal polar duplex sets either bridge or differential;
(f) Any of the above differential services except that all grounded main line battery returns are replaced with an ungrounded wire thus making complete metallic circuits.

The repeater is so arranged that all of the different arrangements can be obtained without change in the wiring of the set. In all cases except that of straight differential polar repetition, so-called adapter sets are required. When the repeater is to be operated with an intermediate station or is to be cut to two terminals sets, a "leg" adapter is inserted in the set, and the operating legs are trunked through a loop switchboard to an operating table. When the set is to be operated by the bridge system over telephone wires, "telephone" adapters are provided which slip into the spaces left in the metal boxes and connect through pin-jacks to the rest of the set. The working of the different arrangements and the adapters sets required will be described in later paragraphs under "Operation."

### INSTALLATION

The apparatus comprising the repeater proper shall be located on standard double deck repeater tables.

### MAIN LINE CURRENT SUPPLY

In general, the sources of main line current are the same for the Universal duplex repeater as for terminal duplex sets, i e., motor generators giving direct current at 80, 110, 160 or 240 volts; and storage batteries charged from motor generators or from commercial mains. At some stations 110v. or 220v. direct current commercial power is available and should be used to avoid transformation losses.

Unless otherwise authorized, all duplex repeaters shall have the negative polarity of the source of main line current connected toward the line for repeating marking signals.

Provision is made for bringing positive and negative main line potentials to each side of the repeater. Two pairs of these are brought to the points of a double pole double throw knife switch so that the voltage can be changed by throwing the switch into one or the other position according to the length and condition of the line terminated on that side. A third pair of potentials is brought to a so-called telephone battery jack and is limited to the maximum allowable voltage for telephone line working. The connection to the main line current supply should be carried through a resistance lamp rack on the repeater table. At the resistance lamp rack, each normal and high telegraph potential tap shall be equipped with 250 ohm resistance lamp 4–A and each telephone potential tap with a 125 ohm resistance lamp 4–A. If the lamp racks are mounted on the repeater table, each tap shall be protected with a 4/10 ampere fuse 57–A or a 3/10 ampere W. B. G. fuse.

### LOCAL CURRENT SUPPLY

The sources of current for the local circuit of duplex sets are of the same character as those for main line current.

For new offices, if a suitable service of 110 volt direct current power is available, it shall be used to provide 30 milliampere local circuits. If such a source of power is not available, consideration should be given to the practicability of supplying local current on a 30 milliampere basis from the 80 volt main line generator or storage battery, if such a generator or battery must be provided to supply necessary main line current. This plan is generally to be preferred in cases where storage battery is used for main line potential. It will often be found that the sum of the first potential main line current and the total local current required will be less than the capacity of the smallest motor generator reguarly furnished. For example, if a 100 watt, 80

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volt generator is installed to supply main line current to five single Morse circuits, it will have sufficient spare capacity to carry the local current load of three Universal duplex repeaters and twelve sin gle Morse sets.

When neither of the above plans can be followed, and the total local current load of the office is too large to be economically carried by primary batteries, a local generator or storage battery will be necessary. The voltage of the local generator or storage battery should be 52 volts. In this case the local circuits of the duplex repeater sets should be operated at 60 milliamperes.

In case 26 or 52 volt local supply is used, a tap of 80, 110, or 160 volts from the main line current supply is necessary to operate the windings of the repeating relays and the motor of the undulator.

### WIRING

All "common" current supply leads, which form part of the connections between generators, light or power mains, or storage batteries and the resistance units, lamps, or other apparatus through which the current is distributed to the telegraph apparatus, shall be installed in accordance with the National Electrical Code, unless other requirements are given in the specifications and drawings applying to the installation.

For the wiring of the repeater sets, i. e., the connections from the resistance units or lamps (or the fuses in the metal box for local circuits of voltages not exceeding 60) to the instruments, and the connections between the instrument themselves, No. 18 B & S gage National Electrical Code solid fixture wire shall be used.

It will be found desirable to sew up the connections of the repeater in two forms as this will facilitate installation when these forms have previously been made upon a forming board and will reduce the modifications necessary to avoid such obstructions as table legs and supporting structures.

### OPERATION

In the following paragraphs, descriptions are given of the methods by which the repeater is arranged for its various classes of service, together with brief descriptions of the various apparatus required.

### THE COMBINATION WHEATSTONE RELAY

The Combination Wheatstone relay is provided with two auxiliary windings for the purpose of increasing the speed of operation of the instrument. One of these windings is referred to as an "opposing coil" and the other as an "accelerating coil."

### OPPOSING COIL

The function of this coil is to quicken the action of the relay by utilizing some of the energy derived from the regular local current to start the armature in motion well in advance of the arrival of the incoming current.

### ACCELERATING COIL

The particular function of this coil is to impart impetus and strength to the armature movement after it has once been started by the action of the opposing coil, and to assist the line current in carrying the armature over to its appropriate contact stop.

Figures 1, 2 and 3 illustrate by means of the current relations, how the Combination Wheatstone relay speeds up the circuit in which it is used. In these diagrams, PC represents the distant transmitter; ML, the main telegraph line; AL, the artificial line; AA, the accelerating coil; OO, the opposing coil; M, the marking contacts; S, the spacing contacts; R, resistance; SC, condenser; and S′ and N′, the fixed magnetic polarity of the relay armatures. The other letters represent designations stamped on the base of standard Wheatstone relays. Arrows point in the direction current is flowing, or tends to flow. For convenience in explanation only those parts of the apparatus directly affected are shown

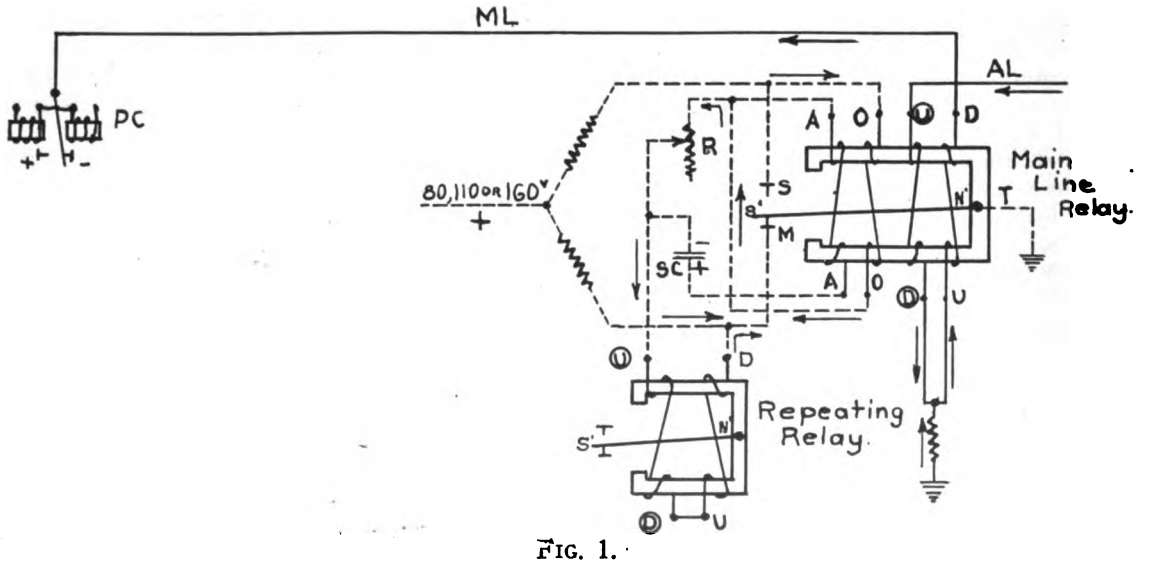


FIG. 1.

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in the diagrams. The home sending apparatus which should not influence the home relay, has been omitted and a grounded resistance shown in its place.

At this instant, the current conditions shown in Figure 2 are brought about. The condenser SC discharges through the accelerating coil over the path shown by the feathered arrows, causing this winding to throw the armature of the relay with considerable force toward the "spacing" contact. The discharge before returning to the condenser divides, part returning through the resistance R and part, by overcoming the self-inductance of the "opposing coil," returning through the windings of the repeating relay in such a direction as to start its armature toward its "spacing" contact. The direction in which the self-induced current tends to flow is indicated by the dotted arrow. The plain arrow represents the direction of flow of the condenser discharge which overcomes this tendency and influences the repeating relay.

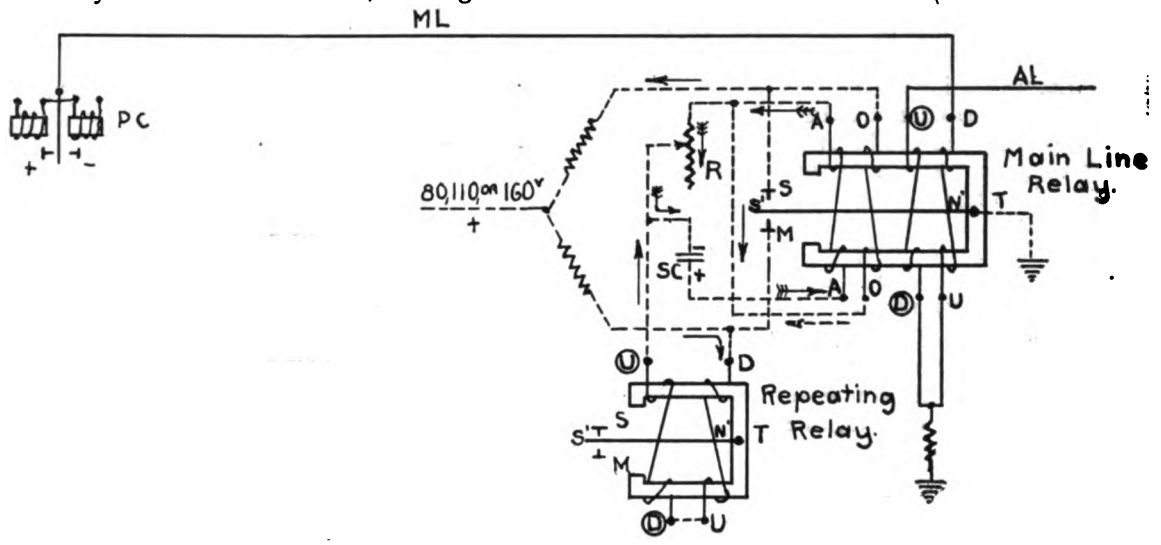


FIG. 2.

By the action of the auxiliary windings and the shunted condenser arrangement, the actions of the two relays are hastened until they operate nearly, if not quite as quickly as the distant transmitter. That is, when the reversed current again flows in the main line, the relays will already be transmitting the signal. Figure 3 shows the current conditions in the various windings when equilibrium has again been reached with the distant transmitter on its spacing contact. A subsequent reversal will bring about all the momentary current conditions shown in Figure 2 except that all currents will be reversed in directions.

Figure 1 shows the steady current directions in the windings of the two relays when the distant transmitter is in the marking position. An inspection of this diagram will show that the direction of current in the opposing coil is such as to tend to neutralize that of the main line coil. As, however, the strength of the local current is considerably less than that of the main line current, the latter prevails, and holds the relay tongue against its marking stop as shown. Due to the drop across the re-

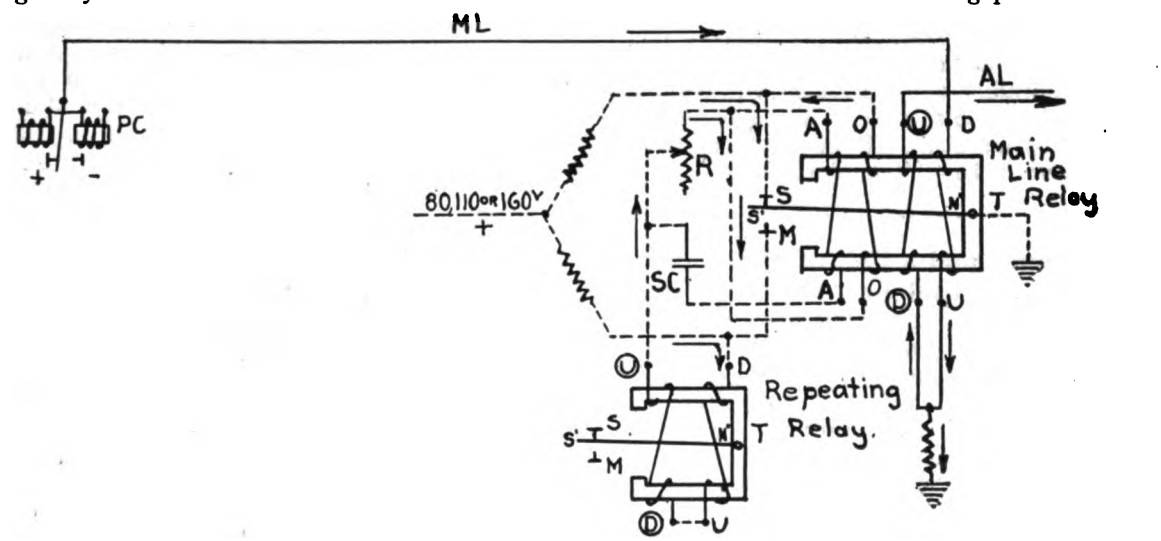


FIG. 3.

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sistance, R, the condenser SC, receives and holds a charge directed as shown. The action of this charge is explained in the paragraphs following.

When the distant transmitter reverses the direction of main line current, there is necessarily an interval during which the main line is entirely cut off from a source of current. During this period the main line current falls in value until the local current flowing through the opposing coil predominates enough to start the armature toward the spacing contact.

Due to the neutralization of the self-induced currents by the shunted condenser, there is little arcing at the contacts of the combination relay. Consequently this relay can be given a very close adjustment. The local circuit through the repeating relay is fairly fast due to the shunted condenser and the absence of inductive disturbances and more movement can be given to the armature of this relay through which all current reversals are made.

THE COMBINATION REGULATOR

The resistance R and the condenser SC of Figures 1, 2, and 3, are assembled together in one piece of apparatus called a combination regulator. The condenser is of the WE-21 type and has a capacity of 2 microfarads. The resistance consists of a number of spool type units connected to a radial arm switch in such a way that resistances of 5500, 7250, and 11,000 ohms can be cut in as required, so as to regulate the value of the local opposing and accelerating current with respect to that of the line current.

*(To be continued.)*

## A Rotarian.

A man that is clean inside and out; who neither looks up to the rich nor down to the poor; who can lose without squealing and who can win without bragging; who is too brave to lie, too generous to cheat; who takes his share of the world and lets other people have theirs.—*New York Sun.*

## An Airplane and a Pair of Spurs.

Airplanes now are used for "trouble hunting" along the Panama Canal Zone telegraph lines, the air service announced on July 7. A seaplane piloted by Lieut. J. R. Duggan and carrying Major Prescott, was sent from Balboa to San Carlos, fifty miles south, to repair a break, completing the round trip and the task itself in an hour and fifty minutes. By horseback over jungle trails the trip would have taken three days.

THAT A BAR OF IRON, when rapidly magnetized and demagnetized, will emit sound, was discovered by Doctor Charles G. Page in the year 1837.

A BOAT was propelled by means of an electric engine on the river Neva, in Russia, in the year 1837. The experiments were made by Jacobi.

## THE "O. O." COLUMN.

### By the Onlooker.

Mary Ann—"Phat is it ye are laughin' at, Bridget O'Toole?

Bridget—Sure, an' it's a tillygram Oi have from Moike.

Mary Ann—'Tis a great liar ye are—sure, the spalpeen can't write his own name.

STATE OF BUSINESS IN THE BIG MAIN OFFICE.

With the check boy, picking up; traffic chief, looking up; wire chief, getting up; repeater chief, lining up; chief operator, sizing up; janitor, mopping up.

Looping the loop is an old stunt with the man at the city board. He has been doing it for thirty years.

Chief Operator—I want it distinctly understood that hereafter being discharged means that there will be no getting back into the service.

Wire Chief—Will any exception be made for the storage battery?

The sender and the receiver on a Morse wire have often been styled the pitcher and the catcher. Under the recently adopted rules would it not—that is—might I ask if it would now be correct to refer to these gentlemen as a dry battery?

Maud had arrived from C—— to take a position in the printer department at D——. She was well acquainted with the quad chief at C——, a neat little chap whom it would not be much trouble for a cat to carry around. A day or two after Maud's arrival at D—— she was observed sizing up Peter A., the two-hundred pound quad chief in that office. and upon being asked how she liked him, said: "I can't understand how the man at C—— can balance a quad against this man."

## A Human Multiplex.

A Brazilian newspaper has three telephone sets attached to one telephone at each end of the line, and three simultaneous conversations are carried on at the same time over this one wire. One pair of users talks English, one pair French, and one pair Portuguese, and the listeners seem to find no difficulty in selecting the sounds intelligible to them and ignoring the others.

THE FIRST STEAM DRIVEN SHIPS to cross the Atlantic ocean, westward, arrived in a United States port in April, 1838. The names of the vessels were: the *Sirus* and the *Great Western.*

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# QUESTIONS AND ANSWERS

### Electric Oscillations.

G. R.—"Free" oscillations are the same as damped oscillations. Audio frequencies range from about twenty per second to 20,000 per second. Radio frequencies extend beyond these figures into billions per second. One cycle represents two condenser discharges, or wave trains; a 500-cycle spark gives 1,000 wave trains. Every antenna structure has a natural wave-length, depending upon its dimensions and its proximity to other electrical structures. The wave length of an antenna may be increased four and one-half times by means of suitable inductance coils without material loss in efficiency.

### Condensers.

G. M. L.—Glad to know you are following the course in electro-physics and that you find the text matter understandable. The amount of energy a condenser can store in electrostatic form equals $.5 \times k \times E$, where $k$ represents the capacity of the condenser and $E$ the applied voltage.

The discharge of a condenser is direct when the resistance between the discharging terminals is very high and is oscillatory when the gap resistance is low.

The capacity of a condenser may be determined by means of the formula:

$$K = \frac{.2248 \times a}{t \times 10{,}000{,}000{,}000}$$

$K$, representing farads, $a$, the area of the plates of the surface in square inches, and $t$, the thickness of the insulating medium in fractions of an inch.

With reference to the resistance of the discharge gap when the discharge is required to be oscillatory, it may be stated that the resistance should not be greater than

$$\sqrt{4\frac{L}{K}}$$

$L$, representing the inductance and $K$, the capacity.

### Telegraph Clubs.

H. H. D.—The Morse Club is a social organization in New York city composed of officials and employees of the Western Union Telegraph Company. Under ordinary circumstances the club holds annually two banquets. The Magnetic Club is a similar organization of Postal Telegraph-Cable Company officials and employees. No regular banquets have been held during the past year or two.

### Radio Transmitter.

W. R. D.—Although a transformer will give better results an induction coil giving a one-half inch spark may be used to send radio telegraph signals over a distance of about five miles, using proper aerials at each end. The condenser connected across the spark gap should consist of a sheet of glass six inches square and one-eighth of an inch thick, with a sheet of tin foil five inches square on each side of the glass plate. The sending helix (oscillation transformer) should be made up of twelve turns of number 10 copper wire, the coil being eight inches in diameter and the turns one-fourth inch apart.

### Lightning Flashes.

Nelson I.—The duration of the light of a lightning flash is but one-millionth of a second. That it appears to last longer than this is due to the fact that the impression of light remains in the retina of the eye for about one-eighth of a second, or 124,000 times longer than the flash lasts.

### Inductive Disturbances.

G. A. K.—Public Service Commission rulings have been made requiring power companies to maintain a clearance distance of not less than six feet between their high tension transmission wires and neighboring telegraph wires. It is difficult to obtain uniform agreement as to the loss to telegraph companies when high tension wires are carried near telegraph lines. Telegraph engineers have reported an average loss to the telegraph company from neighboring high tension transmission lines, as follows: One milliampere of current at sixty cycles coming into telegraph wires causes a loss equivalent to $760 per year, two milliamperes, $2,100 per year, and three milliamperes, $3,400 per year. Losses from twenty-five cycle current are approximately double these figures.

### Simplex and Duplex Cables.

C. A S.—Simplex is the name given to telephone cables which are made up of conductors twisted into pairs. The sizes range from one pair to three hundred pairs and even higher. A three-hundred-pair cable has three hundred and three pairs of wires, and consists of three groups of fifty pairs and three groups of fifty one pairs.

Cables larger than three hundred pairs are made up of groups of one hundred pairs, each of these groups having one extra pair of conductors.

A duplex cable consists of simplex pairs twisted together, making combinations of four conductors, which may be used for phantom circuit operation.

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# Electro-Physics for the Telegraph, Telephone and Radio Student

## Electrons.

In the July 1 installment of this series of articles reference was made to the fact that in the metal of the plates used in forming electric condensers electrons exist, and that it is the shifting of the electrons in the atoms of the metal plates when a source of electric potential is connected to them, which determines the amount of and the direction of the charge taken up by the condenser.

It will be of advantage here to consider some statements relating to the electron theory of electricity, and it is to be understood that this theory accounts for not only the charging of condensers, but the flow of electricity in wire conductors, and for the magnetic properties of bodies possessing or which may be made to possess magnetism.

### THE ELECTRON THEORY.

An electron is the smallest electrified body supposed to be capable of separate and distinct existence. Its mass is approximately .61 x $10^{-27}$ grams. $10^{-27}$ means one divided by ten raised to the 27th power or, in other words, one divided by ten with twenty-six additional noughts added. One thousand grams equals only 2.2 pounds. The radius of an electron is estimated at $10^{-13}$ centimeters. The charge it possesses consists of what has been called "negative electricity"—the electricity possessed by a piece of sealing-wax that has been rubbed with wool. This electron has a fundamental property which distinguishes it from ordinary matter; it repels another electron instead of attracting it, as two particles of matter would do. If it were possible to place two electrons one centimeter apart in a vacuum there would be a force of repulsion of something like $1.16 \times 10^{-19}$ dynes, which in every day language is something like a quadrillionth of a pound. (The dyne is the force which, acting for one second on a mass of one gram, will produce a speed of one centimeter per second.)

The force between the two electrons is approximately $10^{43}$ (10 multiplied by itself 43 times) times as great as the gravitational attraction.

The following imaginary experiment may illustrate to a better advantage the relation of the two forces. If two masses, say of lead, weighing one gram each, were placed one centimeter apart they will attract each other with a force of $6.6 \times 10^{-8}$ dynes, which is entirely too small for any known instrument to measure. But let two grams of negative electricity be placed one centimeter apart and there will be a force repelling the two of approximately $31.4 \times 10^{34}$ dynes or about 320 quadrillion tons. If now one gram of the electricity be replaced by an electron the force repelling the two will be approximately 194 million dynes.

From the above it is quite evident we are dealing with a very minute quantity of free electricity in all ordinary electrical phenomena. The amount can be approximately determined in the following way: The laws of electrolysis state that every atom of matter is capable of uniting with a definite quantity of electricity; it does not depend upon the nature of the element, but its directly proportional to its chemical valency. If hydrochloric acid is decomposed by electrolysis each atom of chlorine carries to the anode a definite quantity of negative electricity and this quantity is measurable with a galvanometer. The weight of the chlorine given up by the acid and the weight of the chlorine atom will furnish a means of calculating the quantity of electricity transferred by each atom of chlorine. This quantity of electricity corresponds to one electron as near as can be determined by the above


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method. This leads to the conclusion that every chlorine atom in the electrolytic cell has an electron associated with it, and in such a manner that it can be detached when a finite force is brought to bear upon it.

Other elements as well as chlorine, such as hydrogen and the metals, do not carry this electron with them when they are in the normal state, hence they are not charged. Each one of the atoms contains a certain number of electrons, but they produce no external effect, it being compensated by some force within the atom which is called positive electricity. Hence when a body has an excess of electrons it is said to be negatively charged and when there is a deficiency of electrons the body is said to be positively charged. When a ball is charged the electrons or positively charged atoms do not leave the surface of the ball due to their mutual repulsion, but on account of the great resistance they encounter at the surface they take a position of equilibrium on the surface itself and stay there, leaving the interior of the body uncharged.

The distinction between conductor and insulator according to the electron theory is made in the following way: The electron is supposed to revolve about the atom with such a velocity that the centrifugal force from this motion is equal to the force the atom is exerting on the electron. All metals are thought of as being a mass of closely packed metallic atoms so that the electrons can easily change from one atom to another with very little loss of energy. In an insulator the electrons are not capable of moving outside the range of the atoms to which they are attracted. They are displaced by an electric force but return to their original position, more or less rapidly, when the force is removed.

The magnetic properties of all bodies can be explained by means of the electron theory in the following way: The atoms of all bodies are surrounded by electrons describing orbits about them just as all the planets rotate around the sun. When all of these orbits are nearly in the same plane the substance is magnetic or rather paramagnetic. If in addition to this the orbits are large enough to influence each other across the distance separating the atoms the substance is ferromagnetic like iron, cobalt and nickel.

When, however, these orbits, in which the electrons move around the same atom, are not in the same plane the substance is not paramagnetic. They are usually spoken of as diamagnetic. All bodies are really diamagnetic, and paramagnetism is a special property which masks the inherent diamagnetism of the bodies. Hence a permanent magnet is a paramagnetic body in which the orbits of the greater number of electrons are in the same parallel plane and the position of the orbits is maintained by the attraction of the orbits upon each other.

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SELENIUM was discovered by Berzelius in the year 1817.

## SHOP TALK.

### On Singling Wires for Test.

BY THE OBSERVER.

Occasionally a wire is "boarded" for trouble; one of the terminal offices patches, or clears it by some method, then immediately replaces the wire in a set without first so advising the distant terminal office. When this is done, generally there is greater delay attracting the attention of the distant office to the circuit than there would have been in calling him in while the wire was singled. Wire chiefs should single circuits as speedily as possible so that there may be the minimum of lost time in getting together.

It often happens that a wire is boarded for a ground trouble, and on singling the wire it is found that the other terminal has the wire still in the set. Unless a particular circuit has been giving considerable trouble and it becomes advisable to trace for location of the trouble, it is not best to ask the distant office to single the wire just to tell him that it is "busted." Rather replace your own set and tell the repeater chief. Some chiefs may inquire how it may be determined that the wire is clear unless a test is made. Surely any good wire chief knows when a ground contact lifts; an opening closes, etc., without getting into communication with the distant wire chief.

There are many kinks that one becomes familiar with in practice, which the inexperienced classify as "queer practice." Experience, however, soon teaches that a good test may have been made by the wire chief at a time when he has perhaps been charged by a repeater chief with giving incorrect information.

One thing that has impressed me as being poorly founded is the practice of placing on short copper wires a voltage of 160 or higher to talk to neighboring test offices. On such occasions although it is necessary to widen key points in order to form the letters (due to too heavy current) the remedy of applying lower potentials is not always resorted to. The higher potentials available should not be used in testing except when attempting to locate swings, etc.

Another thing to remember is: When you ask an intermediate office to take an "end" out of his board, always remove your battery from that wire, so that should the man at the intermediate office happen to touch the bare end of the wire while some other part of his body is in contact with earthed metal, he will not get a severe shock. Every time an operator at a way office gets a shock, the less inclined he is to render assistance to wire chiefs when called upon to do so.

Do not ask an operator to take both ends of a wire out of his board unless it is desired to twist them together, as it often happens that in replacing them they are reversed, with consequent circuit mix-up when patches are required.

Do not ask a distant office to try a certain wire and then leave a voltmeter connected therein unless

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you are in a position to watch the meter, removing same when you observe that the distant office responds. Due to the high resistance of the meter the distant office will have reason to believe that the circuit is open and so report to you. It is a good idea to use the milliammeter to give the indication of current, or a bell, which will be sure to attract your attention when the circuit is complete.

*(To be continued.)*

## Spruce Up Your Plant.

GET YOUR BUSINESS OUT OF KHAKIS

The doughboy has come home. He's through picking Germans off the Rhine. He has discarded his khakis. With his sixty dollar bonus, he has been making a few improvements in his personal appearance. A nice new blue suit of civies, a white vest, a gold chain and a stickpin—you wouldn't recognize him as the hell-fighter of the Argonne.

When he was in the army he didn't give a care about his personal appearance. He had mud three inches thick on his big cowhide army boots, and his khaki pants had become waterproof through the absorption of French clay. He used to dress in a jiffy. First call, then reveille, and he was toeing the line.

But now the Yankee doughboy has gone back to a peace basis. He's sprucing up a bit. He did not wait for prices to drop. He wants to be a "regular feller" now that his job was done.

Business can take a tip from the doughboy. During the war business was dressed in khaki—service enough for the occasion. The emphasis was on production output, and the output was increased tremendously. Machinery was operated at full speed. There was no time to use paint and varnish. And for that matter, paint and varnish couldn't be got; they were needed for the ships of the navy. And men to do the painting and varnishing were needed for war work.

But now it's time to spruce up. Business has made its sixty-dollar bonus during the war. Let it spend it on improvements. Roofs have to be painted. Paint them. Prices won't drop. Your roof will drop first. Business needs a new suit of clothes—buildings have to be remodelled. Do the work now. Machinery has to be overhauled and repaired. Do it now. If you wait machinery will require bigger repairs later.

Business should discard its khakis, and spend its sixty dollar bonus. It will help give work to those 10,000 men or more who are daily being discharged from service. Col. Arthur Woods, assistant to the Secretary of War, is looking for just your kind of job to give the ex-soldiers and sailors who can do just that kind of job.

THE FIRST COLLEGE in the United States to begin technical instruction was the Rensselaer Polytechnic Institute; that was in the year 1825.

## OBITUARY.

GEORGE HALL, a well known telegrapher from 1860 to 1875, since which time he had been prominent in politics at Ogdensburg, N. Y., where he became the leading capitalist of that city, died at Montreal, on June 24. As an operator, Mr. Hall worked in old 145 Broadway, New York office for the Western Union Telegraph Company. Mr. Hall was mayor of Ogdensburg for several terms. He was well known to the older members of the telegraphic profession.

## Electrical Instrument Making for Amateurs.

The above is the title of a book by S. R. Bottone, now in its eighth edition, which was written for the amateur experimenter who desires to learn electrical engineering principles by making electrical devices with his own hands. There are 272 pages and ninety-six illustrations, and detailed descriptions are given of how to make condensers, Leyden jars, induction coils, electroscopes, Tesla coils, magneto armatures, thermopiles, elementary wireless telegraph apparatus and many other pieces of electrical apparatus. The instructions are so simple that only inexpensive tools are required in making the instruments described.

The book sells for $1.35, and copies may be purchased from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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## Submarine Cable Working.

"Beginner's Manual of Submarine Cable Testing and Working," by G. M. Baines, is a book of 265 pages dealing in a thorough manner with the operation of submarine telegraphs.

The first four chapters contain elementary matter relating to batteries, electrical laws, etc. Chapter V. covers copper resistance of cable, instrumental zero, false zero, theory of false zero test; and in the following eighteen chapters up to date matter is incorporated explaining cable insulation tests, inductive capacity of cables, tests for broken cables, curb transmitter, mouse mill device, recorder adjustment and other matter which should form a part of every cable man's technical knowledge.

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### Increased Tariff for Expedited Service.

The action of the Commercial Pacific Cable Company in inaugurating an URGENT cable transmission service on the Pacific cable, at a rate three times the ordinary rate from point of origin to destination, is a step which should long ago have been taken, not only in cable service but in land line service. Managers of telegraph offices have long known that there is a public demand for an expedited telegraph service—a service that would be positive in accomplishment. There is hardly an office in the country which does not daily have to give a negative reply to the inquiry: "If there is any way this message can be rushed, I will pay extra."

There will always be a class of telegrams which can stand a transit time of three or four hours from a given point in the United States to any other point, and there is now a large volume of business handled by the telegraph companies which the senders understand will require a transit time of from twelve to fourteen hours; but there has always been a demand for a grade of service, which for various reasons, has not been furnished. This service would be in telegraphy the equivalent of special delivery service in the post office, the tariff for which is six times that of an ordinary letter.

Those who have been closely identified with the upbuilding of the volume of telegraph traffic know that the one thing which has hindered most the traffic growth is the fact that after a telegram is handed in for transmission the sender of the message knows nothing of its fate until the person addressed sends a reply, which in some cases he sends by mail. It is true that the sender of the message may send a second telegram to the office of delivery asking for a report of delivery, and, also, the office of origin may send a free service message asking for the same information, but these facilities are unsatisfactory, expensive to the telegraph company, and little understood by the public.

The establishment of a properly organized special delivery telegraph service at double tariff rate, which would bring to the sender of the message notice of delivery and prospects for a reply, would, we believe, result in satisfaction to the public and an increased revenue to the telegraph company.

As time goes on the mail service is likely to be very greatly improved, and it is now apparent that the airplane will, within a few years, be a competitor of wire communication. As the transit time of letter correspondence between city and city is reduced, telegraph service, in order to survive, must be speeded up and made positive.

One factor which has always been present as a deterrent in plans looking to an expedited and positive service by telegraph, was the probability of failure in performance. The telegraph companies in the past had not a strong faith in the stability of their lines; consequently they were loath to inaugurate a service which they believed could not be maintained. This view is no longer excusable. Telegraph engineers of the present know how to build lines that are dependable. Dependable lines, duplicate routes, and systems of multiplex transmission, either Morse or printer, which give to a single route added traffic capacity, make possible the establishment of a grade of telegraph service never before practiced.

It will cost considerable money to make the required improvements in telegraph plant. The improved service resulting therefrom would, we believe, result in an increase of revenue which would pay the bill.

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# CURRENT EVENTS

## EXECUTIVE OFFICE ANNOUNCEMENTS, PERSONAL MENTION, APPOINTMENTS

### PERSONAL.

MAJOR GENERAL GEORGE O. SQUIER, who arrived from Europe on the *Aquitania*, July 20, was, while in England, decorated with the order of Knight Commander of St. Michael and St. George: the ceremony being performed by Sir Douglas Haig.

H. B. PERHAM, for the past twenty years, President of the Order of Railroad Telegraphers, St. Louis, Mo., who was recently succeeded by E. J. Manion, proposes to take an extended vacation in the mountains of Colorado to recuperate his somewhat broken health.

ROY E. DE LAY, during the war, Captain in the Signal Corps service, War Department, Washington, and formerly division engineer, Mackay Telegraph and Cable Company, Dallas, Tex., has signed a contract to go to China for two years on telegraph and telephone engineering work for a British Company engaged in government work. He sailed from San Francisco, July 26.

S. J. KONENKAMP, since 1908 president of the Commercial Telegraphers Union of America, has resigned from that office. When arrangements have been made for his relief Mr. Konenkamp intends to take up the practice of law.

J. F. SLACK, a well known old time telegrapher, identified with the Western Union Telegraph Company at Sweetwater, Tex., who was stricken with paralysis on June 9th, is rapidly recovering and it is thought that he may be able to return to duty in the near future.

E. R. MAHAN, of the Postal Telegraph-Cable Company, Philadelphia, accompanied by his mother, was a recent New York visitor while en route to Brockton, Mass., where he will remain two weeks.

E. H. CURLETTE, the well known old-time expert Morse operator, is now associated with the firm of L. H. Horton and Company, brokers, New York, in charge of the company's telegraph facilities.

DAVID WARK, well known in commercial telegraph and brokerage circles, is now telegraph reporter for the New York Stock Exchange. Mr. Wark is mayor of his home town, Closter, N. J., and is the owner of the famous Hazlehurst kennels.

### WESTERN UNION TELEGRAPH COMPANY.

NEWCOMB CARLTON, president, has returned from his annual vacation, which he spent fishing in the waters around Newfoundland.

#### General Conference of Division Officials.

A conference was held at 195 Broadway, New York, July 23-26, of the division commercial, traffic and plant superintendents, to consider various matters pertaining to the company's business and operations.

Those in attendance were: Eastern Division—Thomas W. Carroll, general manager; S. B. Haig, division traffic superintendent; M. C. Allen, division plant superintendent; and F. E. D'Humy, central office engineer. Southern Division—S. L. Burts, division traffic superintendent; L. H. Beck, division plant superintendent; and H. C. Worthen, general manager. Lake Division—A. C. Cronkhite, general manager; J. J. Welch, division traffic superintendent; and M. B. Wyrick, division plant superintendent. Central Division—A. D. Bradley, general manager; A. Long, division traffic superintendent; and J. G. Gilbert, division plant superintendent. Gulf Division—S. M. English, general manager; B. P. Hancock, division traffic superintendent; and J. G. Gilert, division plant superintendent. Pacific Division—M. T. Cook, general manager; C. R. Fisher, division traffic superintendent; and J. L. Ord, division plant superintendent. Mountain Division—A. B. Cowan, general manager; C. H. Finley, division traffic superintendent; and W. C. Titley, division plant superintendent.

C. A. WEBBER, chief operator of the main office, Minneapolis, Minn., has resigned to accept a position outside of the telegraph business, and has been succeeded by E. L. Davenport of the Omaha main office.

C. S. BRISCO has been appointed chief operator of the main office at Shreveport, La., effective August 1.

THE APPOINTMENT OF J. T. Goodrum as chief operator at Atlanta, Ga., has been announced, dating from April 1, 1919.

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### New York Western Union.

TO FACILITATE EXPANSION of the several departments occupying 24 Walker Street, New York, the collection and complaint departments have been moved to newly leased quarters on the fifth floor of 395-399 Broadway, located at the southwest corner of Walker Street and Broadway.

THE TESTING AND REGULATING DEPARTMENT has started a school for the instruction and care, operation and management of the Multiplex System. Many of the Morse operators are making multiplex a study.

A SON was on July 17 born to the wife of J. J. Boelson, assistant manager and cashier of the Western Union office at 547 West 34th Street, New York.

### New Western Union Office at Ft. Worth, Tex.

The Western Union has completed its new quarters at 701 Main Street, corner of Sixth Street, Fort Worth, Tex. The building is a two-story structure and is used exclusively by the telegraph company. On the second floor are located the operating department, testing and regulating and telephone departments. At the rear are the employees' quarters. The first floor is devoted to the receiving and delivery departments, also the general clerical forces.

### Chicago Western Union.

E. F. DANN, a member of the staff of Division Traffic Superintendent S. B. Haig, New York, was a recent visitor at Lake Division headquarters, Chicago.

B. D. BRANKEY, automatic attendant, Chicago main office, recently released from service in the United States Navy, has resumed his duties in the automatic department.

HARRY CULLEN, until recently in the naval service has returned and resumed his duties as assistant to Wire Chief Webber of the Chicago main office.

CLAUDE B. DRESSER, who during the war has been managing multiplex printer circuits in the service of the American Expeditionary Forces in France, has returned to Chicago and taken up his former duties as automatic attendant.

W. H. STRANG, chief operator of the Cleveland, Ohio, office was a recent visitor in the Chicago office. Mr. Strang had with him a fishing pole and a vacation smile.

E. H. MARTIN, division traffic inspector, made a trip recently to Kansas City. On his return he was accompanied by Mrs. Martin, who has been visiting in Kansas City.

CHICAGO TRAFFIC LOCAL, No. 1, Association Western Union Employees, held its election for officers July 3, the following being elected: George H. Campion, president; J. A. Riley, W. J. Finn, Evan Cole, Josephine Judge, Roy B. Miley, and Charles H. Byington, vice-presidents; John E. Pursley, secretary; C. B. Ewan, treasurer. Electors nominated for the coming year are: James L. Pember and John E. Pursley.

M. A. FRYE, of Division Traffic Superintendent Welch's office, is the author of several instructive engineering articles dealing with multiplex printer operation, which have appeared in telegraph journals.

THE ENGINEERING AIDS of the Chicago office have in hand the proposition of forming an engineers' society with headquarters in Chicago, but to include members from all parts of the country. Messrs. George E. Palmer and M. A. Frye, who are giving the subject attention, report that the idea is meeting with general approval and encouragement.

## POSTAL TELEGRAPH-CABLE COMPANY.

EDWARD REYNOLDS, general manager, spent the week end, July 26-28, in Pike County, Pa.

JAMES P. O'DONOHUE, division electrical engineer of the Eastern Division, after his return from a trip of inspection to Cleveland and intervening terminal points, started on his annual vacation, July 19.

THE COMPANY has ordered the material for, and has under way a considerable amount of new line construction, including the stringing of additional wires over existing trunk routes.

JOHN F. CLEVERDON, chief electrical inspector, New York, has returned from his vacation, which he spent at points along the Hudson river.

ROBERT H. MILLER, manager of the Fulton Market office, New York, has returned from a two weeks' vacation spent along the Massachusetts coast.

HARRY WILSON, manager of the office at 45 Broadway, New York, spent his two weeks' vacation auto-touring through New Jersey.

JOSEPH J. MCCAULEY, of city manager E. P. Tully's office, New York, joined the Signal Service when the United States entered the war, and has since been promoted to a captaincy. He returned from overseas on the *Aquitania* recently, as an aid to Major General G. O. Squier, who returned on the same ship. During the peace conference Captain McCauley was in charge of telegraph arrangements.

MANAGERS APPOINTED: D. P. Beckham, Santa Barbara, Cal.; R. M. Cook, East Las Vegas, N. M.; Paul A. Moldenhauer, El Paso, Tex.; Julia Christiansen, Laramie, Wyo.; L. L. Fuller, Pine Bluff, Ark.; G. M. Rich, Leominster, Mass.; E. W. Hallas, Salmon Falls, N. H.; M. H. Griswold,

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Albion, N Y.; Beatrice Morris, Medina, N. Y.; L. L. Dunn, Lincoln, Neb.; J. P. Feeney, Grand Island, Neb.; M. E. Skinnell, Portsmouth, Va.; M. Davis, Grinnell, Iowa; O. H. Lincoln, Harvey, Ill.; J. A. Law, Plant City, Fla.; O. E. Rabourn, Newton, Iowa; D. D. Magill, Aiken, S. C.; J. L. McDowell, Port Arthur, Tex.; T. C. Waters, Salem, Ore.; U. N. Harris, Blacksville, S. C.

C. A. MATHANY, manager of the Lima, Ohio, office of this company, has been advanced to the managership at Akron, Ohio.

R. H. CORNWELL has been appointed cashier of the San Francisco, Cal., main office.

### A. F. Adams,

PRESIDENT OF THE AUTOMATIC ELECTRIC COMPANY.

Announcement has been made that Theodore Gary, A. F. Adams and H. L. Gary, leading Independent telephone men of Kansas City, have become financially interested in the Automatic Electric Company of Chicago, manufacturers of automatic telephone apparatus, and that these gentlemen will take an active part in the management and extension of the Automatic company's business.

It is stated that A. F. Adams will be elected president of the company, and H. L. Gary, vice-president and treasurer. Of the old officials J. B. Russell, Harmon A. Harris and Grant Pelton will remain as vice-presidents; the manufacturing and operating staffs to remain as at present. Joseph Harris, who has been president of the company since its organization, will become chairman of the board and Theodore Gary will be chairman of the executive committee.

The Gary company is to retain control of the Independent telephone properties now operated by it.

A. F. Adams, the new president of the Automatic company, was until the termination of government control the representative of Postmaster General Burleson in the management of the lines of the Postal Telegraph-Cable Company, New York.

### Code Rules for Signaling Systems to Be Revised.

The regulations governing the wiring of signaling systems are now being revised. These regulations refer especially to Rule 85 of the National Electrical Code. Any interested engineer who has ideas to offer which it may be thought well to consider should communicate with Ralph Sweetland, chairman of the Committee on Signaling Systems, 141 Milk Street, Boston, Mass.

### United States Greatest Publisher.

The United States government runs a printing office as big as the offices of the six biggest publishing houses of the country put together. It costs about $12,000,000 a year to operate and prints so many documents that are sent through the mails franked that if postage were paid on them $86,000,000 worth of stamps would be required.

## THE CABLE.

### Urgent Transmission Service to the Philippines, China and Japan, via San Francisco.

Under date of July 10, the Commercial Pacific Cable Company gave out the following notice:

"To provide for the quicker transmission of market quotations and trade reports and so improve the position of American merchants and manufacturers in their competition for the trade of the Far East, the Commercial Pacific Cable Company has decided to accept cablegrams for URGENT transmission to the Philippines, China and Japan. This new service is given in response to repeated requests that this special facility common in other countries be afforded here and so help to remove the disadvantages under which American trade operations are laboring. We also find that various expedients are being used by which a few have obtained advantages over the many in the transmission of cablegrams to and from the Far East. This new service will render available to all any possible acceleration of transmission. It will be subject to discontinuance at any time without notice, and it is believed that it will become unnecessary after peace conditions have been fully restored.

"The rate will be three times the ordinary rate from origin to destination.

"In cablegrams intended for URGENT transmission the sender must write the word 'URGENT' before and as a part of the cable address."

THE EASTERN TELEGRAPH COMPANY announces that the tariff for cablegrams between points in Great Britain and Hong Kong, China, Japan, and the Philippines will be reduced six pence per word, dating from September 1, 1919.

### Cablegrams to Germany.

The cable companies announces that business messages in plain English or French may now be accepted for points in Germany. Messages of a personal nature are not yet permitted. The rate from New York is 32 cents per word.

### Cable Ban Lifted.

At midnight, July 23, cable censorship was abolished so far as British controlled cables and wireless telegraphs are concerned. Cablegrams are now accepted without restrictions to all British possessions (with the exception of Egypt), and generally to all parts of the world. On the same date all restrictions imposed by the United States censorship were removed.

### Cable Staff Changes.

The following staff transfers have taken place in the service of the Eastern Telegraph Company: G. J. Hyde and W. N. Markham, to Carcavellos;

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M. W. Massey, R. P. Mann, H. T. Fickling, E. R. Miller and C. W. Cartwright, to Gibraltar; R B. Grenfell, to Mossamedes; S. J. Twohy and C. E. Crough, to Ascension; S. H. Davis, to Malta; F. G. Eastwood, J. H. A. Matthews and P. W. Moores, to Suez; G. M. Foster, to Durban; S J. Slingo, to Mozambique; G. T. Osborne, to Zanzibar; H. E W. Lockyer, to St. Helena; R. L. Bryant, to Saukim; and E. H. Heselton, to Bombay.

In the service of the Western Telegraph Company the following staff movements have taken place: M. R. R. Yates and H. V. Holley, to St. Vincent; E. Simpson, to Buenos Aires; A. T. Klesel, F. Millington, H. V. Nicolle, and H. J. L. Calviou, to Madeira; A. V. Hayne, H. H. T. Saunders, and G. F. Mardock, to Rio de Janeiro; and A. G. H. Seymour, to Pernambuco.

Eastern Extension Telegraph Company staff changes: F. B. Pfordten and A. R. Watson, to Singapore; E. T. Beckerleg, to Cape St. James; F. W. Morgan, to Batavia; A. O. Mitchell and W. H. Ford, to Madras.

In the service of the Pacific Cable Board, A. E. Killworth has been transferred to Fanning Island, as also have W. A. R. Pearce and H. J.. Williams; H. J. Foster, to Bamfield; A. K. Hoskings, to Auckland; A. R. Morris, to Suva; C. E. Greville, to Fort William; and E. C. Mansfield, to Montreal.

## New Telegraphic Code Published in Germany.

It is reported that a new standard telegraphic code, called the Seedienst code, has been published under the auspices of the German government. An appendix to this code will contain the names, alphabetically arranged, of all of the concerns in the world that subscribe to the code, provided the subscriber wishes to have his name included in the list. The price per copy of the code, with inclusion of name of subscriber, is 72 florins ($28.94) for the first 4 copies ordered, 65 florins ($26.13) for the next 4, and 60 florins ($24.12) for the next 15. The price per copy, without inclusion of the purchaser's name, is 60 florins for the first 4 copies, 56 florins ($22.50) for the next four, and 52 florins ($20.90) for the next 15.

The Seedienst code is a five-letter code; for the sake of convenience the 5-letter groups as well as 10-word groups (comprising the word phrases) are given. It is modeled after the A B C code, and is said to be so arranged that it will effect a saving of from 50 to 75 per cent of the ordinary charges for open messages.

In addition to the code proper, a directory of all shipping concerns, insurance companies, etc., is given. The books also contain tables of comparative values of the different currency systems of the world and of metric measures (square, cubic, and linear) with their various equivalents.

It is said that the German government will require all German concerns to recognize the Seedienst code. The result of this requirement would be that firms doing business in any country with which German concerns are in commercial relation will have a tendency to use the code in order to save telegraphic charges.

# RADIO TELEGRAPHY.

### MARCONI NOTES.

E. J. Nally, vice-presdent and general manager, sailed for England on the *Aquitania*, on July 26, on a business trip.

J. C. Macbeth, managing director of the Marconi International Code Company, Limited, London, arrived in New York recently on the *Olympic*.

Herbert M. Short, New York representative of the English Marconi Company, returned on the *Olympic* recently, after a month's stay in England.

Harold H. Gallison, formerly of the head office, has returned from France entirely recovered from his injuries, and has received an honorable discharge from the army.

Lewis B. Stewart, formerly of the auditing department, who has been relieving in the navy as chief yeoman, has been released from service and has arrived in New York.

Julius A. Bohl, chief gunner, U. S. N., who has been stationed at the American Base, Marseilles, has been released from the service, and resumed his former position as superintendent of the Gulf Division at New Orleans, relieving Paul C. Ringgold, who has returned to New York.

Marion H. Payne, assistant treasurer, is enjoying his vacation on the sands at Ocean Grove, N. J.

Roy A. Weagant, chief engineer, is spending his vacation at his new home on Long Island.

In one day recently, in New York harbor, there were counted ninety-seven ships equipped with Marconi wireless telegraph apparatus.

The Kilbourne and Clark Manufacturing Company of Seattle, Wash., manufacturers of radio apparatus, has recently completed the construction of a specially designed and equipped factory, the total floor space being about 46,000 square feet.

C. F. Elwell, consulting radio engineer, has been awarded the Cross of the Crown of Italy, on the proposal of the Minister of Marine. Mr. Elwell erected and equipped the radio station at Rome, Italy, which furnished direct communication with the United States, as well as with stations at Lyons, Nantes, and Eiffel Tower, France; and Salonica, Greece.

## Marconi Wireless Telegraph Company, of Canada.

Shareholders of this company will be invited at the approaching general meeting to agree to the reduction of the nominal value of their shares from $5 to $2.50, and to the creation of 500,000 additional shares of $2.50 each. By this arrangement the total nominal capital of the company will be reduced to $3,750,000; the company will be entirely

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clear of its heavy liabilities; will be provided with substantial working capital, and enter into possession of a second high-power wireless station, which will enable it to open up additional telegraph service.

Mr. Arthur H. Morse has been appointed managing director of the company and will shortly arrive in Canada to take up his duties.

### News Notes of the Engineering Staff of the Wireless Improvement Company, New York.

Alfred S. Kuhn, formerly with the Lowenstein Radio Company, and later consulting engineer, has been appointed assistant chief engineer of the Wireless Improvement Company, at 47 West Street, New York.

Otto A. Martini, formerly production engineer, has been appointed assistant general manager.

J. D. R. Freed, formerly expert radio aid at the Washington Navy Yard, has left the Navy Department and is now employed as designing engineer in charge of the designing and drafting departments.

John R. (Jack) Irwin, who originally gained fame as the operator who attempted with Walter Wellman to fly across the Atlantic in the first blimp which essayed to make the crossing, but was abandoned in midocean, has been appointed sales engineer of the Wireless Improvement Company. After Mr. Irwin's exciting experiences on the airship *America*, he toured the country in vaudeville *à la* Jack Binns, and later resumed his position with the Marconi Wireless Telegraph Company, and became commercial superintendent of the Pacific Coast division. He came to the Wireless Improvement Company from the aviation section of the United States Army where he was a pilot during the war. He expects to continue flying, to some extent, in the testing of the aircraft apparatus which is being produced by the company.

### Batteries for Audion Circuits.

The type of storage cell manufactured by E. Marcuson, 70 Cortlandt Street, New York, is finding a wide application as a suitable source of current for the "B" circuit in audion hookups.

### A "North of Ireland" Man, at That.

A North of Ireland man wanted to send a telegram to a friend in a remote part of the island. The clerk told him the charge would be one shilling and sixpence.

"How do you make that out?"

"Sixpence for the wire and a shilling for delivery outside the radius."

"That be hanged! retorted the Irishman. "You send the telegram and I'll write and ask him to call for it."—*Boston Transcript.*

PLATINUM was discovered in the year 1750 by William Watson, in England.

## HIGH FREQUENCY SIGNALS OVER TELEGRAPH WIRES.

### Account of Recent Tests of the Squier System Over a Telegraph Wire Between Washington and Baltimore.

[The following paper published in the *Journal* of the Franklin Institute, for July, by Lieut. Col. J. O. Mauborgne, gives an account of experiments recently conducted on a Postal Telegraph-Cable Company circuit between Baltimore and Washington, employing the Squier high frequency system of signaling over wires]:

Attention was first directed, in 1911, to the practical utility of employing high frequency electric waves for transmission of energy along wires by Major (now Major General) George O. Squier. The discussion following the publication of his results indicated that, in the minds of many, the opinion prevailed that because of the excessive attenuation obtaining at the "ultra audio" frequencies, the system would be inoperative over great distances. This was thought to be particularly the case if frequencies greater than 100,000 cycles per second were employed.

Recently this subject has assumed an important aspect from a military standpoint and it was decided to conduct further experiments with the object of examining the possibility of adapting certain existing types of radiotelephone and telegraph apparatus to multiplex operation. The results of the few preliminary tests which have been made recently by First Lieut. R. D. Duncan, Jr., and Radio Engineer Samuel Isler of the engineering and research division, Signal Corps, Washington, D. C., are of interest because they have shown that not only is it possible to transmit energy, at least in sufficient amounts to actuate standard "radio" receiving apparatus, over comparatively long lengths of wire circuits, but that frequencies considerably in excess of the value hitherto named as the upper limit could be employed.

The apparatus used in these tests is known as the SCR-67, which is the ground set of the standard ground-airplane radiotelephone equipment. It comprises two, three-electrode vacuum tubes, of the transmitting type (Type VT-2. One oscillator and one modulator) and connected circuit, a receiving tube (Type VT-1) and circuit, and a two-stage audio frequency amplifier. The method of modulation, that devised by Heising, is based on the fact that, to a very close approximation, the amplitude of the high frequency current is directly proportional to that of the E.M.F. applied between the plate and the common filament terminal of the oscillating tube; any variation of the E.M.F., for example, at an audio frequency, will modulate or mould the continuous flow or high frequency energy in a corresponding manner, which when received by a tuned receiving circuit and rectified, manifests itself as an audible sound in a telephone receiver. The means by which the modulation is accomplished is by a second tube, whose plate filament path resistance is varied in accordance

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with the speech frequencies applied to its input terminals. By properly interconnecting the plate or output circuits of the oscillating and modulating tubes, and by further converting the high voltage plate power supply to the two tubes from a constant potential to a constant current system the variation in amplitude of the high frequency current may be made to follow out faithfully the variations impressed by the modulating source. This system is advantageous since the completeness and purity of modulation is practically independent of the frequency of the oscillating system.

The line may be connected to the source of oscillations in a number of ways, of which probably the most convenient is by inductive coupling.

To provide a practical means for carrying out of the tests, a wire, running from Washington, D. C., to New York City, was placed at the disposal of the Signal Corps by the Postal Telegraph Company. This line was duplexed and was in continuous operation by the Postal Company. In the first series of tests one multiplex station was established at the Signal Corps Radio Laboratory, Bureau of Standards, Washington, D. C., and a second at Dixon's Park, Curtis' Bay, Md., approximately three miles from the Postal office in Baltimore, the total wire distance between the two approximating 60 miles. The multiplex apparatus was connected to the line at these two points.

Satisfactory two-way communication was obtained; speech was received at both stations, loud and with exceptional clearness, the distortion common and inherent to long distance wire telephony being completely absent. The tuning at the receiving stations was quite definite, comparable in every respect to that when receiving signals of a "sharply" tuned radio station. This last fact permits of the operation of a number of multiplex units, each tuned to a different frequency and without the use of filter circuits on the same wire line. The carrier frequency employed in these tests was 600,000 cycles per second (wave length 500 metres); the effective line current, measured at each of the transmitting stations, averaged 60 milamperes. Throughout the test the operation of the multiplex apparatus in no way interfered with that of the wire telegraph apparatus nor was interference experienced from the latter.

The satisfactoy range of an SCR-67, when operating as a ground "radio-telephone" set, in communication with a corresponding SCR-67, is, under ordinary conditions, 10 miles. Thus by confining and directing the flow of energy to a definite direction the range is materially increased.

The advantage of multiplex telephony and telegraphy are many. From a military standpoint alone it is obvious that in time of war any means of increasing the traffic handling capacity of already overburdened telephone and telegraph lines will be of inestimable value. There is a further advantage from an economical standpoint, in that certain of the existing types of Signal Corps radio-telephone and telegraph apparatus, large quantities of which were purchased during the war and which are now idle, with only slight changes in construction, may be adapted to either radio or multiplex operation The increased range obtained makes possible the connection of outlying military posts and establishments with low power units where ordinarily comparatively high power and consequently heavier apparatus would be required if strictly radio communications were solely relied upon.

## New Book on Radio Telegraphy.

"Principles of Radio Telegraphy," is the name of a new book by C. M. Jansky, which covers the latest practice in radio engineering. The book contains 237 pages and has 179 illustrations.

The first four chapters deal with elementary electrical engineering as applied to radio work, and the remaining seven chapters go thoroughly into the subjects of electromagnetic waves, alternating currents, oscillatory circuits, radio circuits, practical transmitting appliances and methods, practical receiving appliances and methods, and vacuum tubes and their use in wireless telegraphy.

We recommend this fine work to all who are studying or who intend taking up the study of radio signaling.

The price of the book is $2.00 and copies may be purchased from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

## "Mathematics for Engineers."

"Mathematics for Engineers" is the title of a work by W. N. Rose, which embraces all of the mathematics needed by engineers in practice and by students in all branches of engineering science. The work is in two volumes; the first carrying the studies through algebra, plane trigonometry, mensuration and graphs, the work being carefully graded from an elementary to an advanced stage. The second volume is devoted to the calculus and its applications, harmonics and vector analysis, spherical trigonometry, etc. Volume I. contains 507 pages and is an excellent book for the telegraph and telephone engineer or student to possess, as the treatment of the subject of mathematics here worked out is from the engineer's standpoint.

The price of each volume is $5.00 and copies may be procured from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

J. B. NORRIS, an old time and military telegrapher during the Civil War, for over 30 years manager of the Chattanooga, Tenn., Western Union office, now living in retirement at Santa Monica, Cal., in renewing his subscription for another twelve months, writes: "Your July 1 issue was particularly good in amount of matters of interest to those out of the game; but still full of what is new and entertaining to all, it enables one to keep posted, as well as keeping in touch with our friends who are active telegraphically."

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## IMPORTANT DECISION GOVERNING THE USE OF THE INVENTION OF THE THREE-ELEMENT VACUUM TUBE.

During the war litigation over rights for the manufacture and sale of vacuum tube detectors for radio work was suspended by common consent, and tubes for government use were made at various works. As the situation stood at the close of hostilities an attractive market for bulbs was in prospect, but patent rights prevented any one manufacturer from entering the field independently. The Marconi Company held rights covering the use of a two-element bulb, Dr. De Forest's patents protected the use of the third element, and the Moorhead Laboratories in San Francisco had patented other features also essential to the commercial production of the best tubes, among these being the use of a chemical process for exhausting air. During the war the Moorhead Company had developed manufacturing facilities rapidly and bulbs were being turned out for the Allied Governments at the rate of 30,000 per month.

Early in May, representatives of the Marconi, De Forest, and Moorhead companies held a conference in San Francisco, and agreed that the patent rights of all three should be extended to the Moorhead Company, for which the latter should make payment to the other two on a royalty basis. This company is only permitted to make receiving and amplifying tubes, the Western Electric Company having the rights to manufacture the transmitting tubes. It was also agreed that the Marconi Company would become the sole sales and distribution agent for the Moorhead output. The tube produced under this agreement is known as the Moorhead audion.

On July 7, Judge Mayer, in the United States District Court, New York, in the suit brought by the Marconi Company against the De Forest Radio Telegraph and Telephone Company, handed down a decision holding that the Marconi Company's patents for vacuum tube devices give that company priority over the De Forest Company.

### MARCONI COMPANY'S STATEMENT.

Upon announcement of Judge Mayer's decision the Marconi Wireless Telegraph Company of America, through Vice-President and General Manager E. J. Nally, gave to TELEGRAPH AND TELEPHONE AGE the following statement:

"The recent decision of Judge Mayer, of the Federal District Court, broadens the scope of the basic Fleming patent for vacuum tubes, owned by the Marconi Wireless Telegraph Company of America, to include not only receivers and detectors, but the oscillion or oscillating vacuum tube for generating high frequency oscillations. This litigation was against the De Forest Wireless Telegraph & Telephone Company, to restrain them from manufacturing and selling the three-element audion either for reception and amplification, or as a vacuum tube generator.

"The effect of Judge Mayer's original decision in favor of the Marconi Company, so far as concerned a detector for radio signaling, as affirmed by the Circuit Court of Appeals, was to accord to the Marconi Company's invention a high place in the art. Judge Mayer's recent decision places the basic invention still higher in the art, as controlling the oscillion, since it has been legally determined that the Marconi valve possessed inherently the ability to generate oscillations.

"The decision turned upon the proposition, that, as the Marconi Company gave the art a new instrumentality, and as that instrumentality without inventive changes or additions will oscillate as well as detect, the Marconi Company is entitled to the benefits of this feature."

### THE DE FOREST COMPANY'S VIEWS OF THE DECISION.

In a statement made by the De Forest Company, they say:

"In the first place, the Fleming valve patent is admitted by the Marconi Company to be for nothing more than the use of the Edison lamp for high frequency or radio work. Prior to Fleming's time it had only been used for low frequency or wire work. In spite of the frank admissions of Professor (now Captain) Armstrong, of the United States Army, who was a witness for Marconi at the trial, that it makes no difference whether the device is used in connection with high or low frequency so far as its operation is concerned, and the further fact that the scientists and engineers throughout the world concur with Captain Armstrong, and that the Fleming device consequently was nothing more or less than a new use of the Edison device, Judge Mayer decided this in his opinion and the Circuit Court of Appeals affirmed his decision, making Fleming's contribution to the art of wireless valuable in law if not in fact.

"Fleming's contribution was made in 1905, and not until 1914 or 1915 did the Marconi engineers discover the oscillating phenomena of vacuum tubes, and then only in connection with use of the three-electrode audion of Dr. De Forrest's invention. The oscillating phenomena had, however, been discovered by Dr. De Forest prior to that time.

"The De Forest contention which still appeals as the only logical contention is that Fleming, having adopted the Edison device for a specific purpose; namely, as a receiver of wireless waves, anyone else—for example, De Forest—can likewise adopt the Edison device for a new purpose —for example, for transmission purposes. In other words, De Forest or anyone else is as much entitled to use the Edison invention in a new way as was Fleming.

"On the theory that the oscillating audion or "oscillion," as it is termed by its originator, did not differ in construction from the three-electrode audion detector which in law has been held to be an infringement of the Fleming patent, the Marconi Company contended that the oscillating audion or oscillion should therefore be included as an infringement of the Fleming patent in law, if not in fact. Their contention has been successful before Judge Mayer, but it remains to be seen whether or not the

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higher court will confirm Judge Mayer's conclusion. The fact remains and is stated by Judge Mayer's opinion, that the oscillating quality of the three-electrode audion is a subsequent invention to Fleming and is frankly admitted to be such by the Marconi Company, and Fleming makes no mention and had no idea of such phenomena at the time he adopted Edison's lamp for wireless reception purposes.

"In so far as advancing the art for transmission of wireless waves is concerned, Fleming has contributed nothing, as the Fleming valve device has never been used and is incapable of use for this purpose. On the other hand, the three-electrode audion or oscillion has been used effectively throughout the world, and in praticularly large quantities by the United States government during the war. The practical effect of Judge Mayer's decision, therefore, should it stand, is that a paper patent for a structure incapable of use has been set up as an obstacle to the only practical device of this nature which may be used for transmission of wireless waves, with the result that, while the wireless art needs and demands the oscillating audion or oscillion for transmission purposes, they are unable to obtain the same because the Fleming patents, which the radio art does not want because it cannot work and they therefore cannot use it, has been set up as an obstacle, and in this particular instance and under these peculiar circumstances the patent laws have failed in their statutory intent to 'promote arts and progress,' in that the present situation presents conditions wherein a patent by legal decision is obstructing the art and progress in the art.

"On the other hand, the De Forest patents have likewise been maintained and, as the Marconi Company has been enjoined against the manufacture, sale or use of the three-electrode devices, the foregoing is emphasized by the peculiar legal situation which arises therefrom in that, though the world at large wants the three-electrode device, the De Forest Company and its licensees cannot supply the same in view of Judge Mayer's opinion because of the Fleming two-electrode rectifier patent and the De Forest Company and its licensees are the only ones who can supply the same, because the De Forest Company owns the three-electrode audion patents, the invention of Dr. De Forest."

Dr. De Forest says, in regard to the decision handed down by Judge Mayer, that it is liable to inflict a most severe and unnecessary handicap upon the development of the art of radio for the next three years, or until the Fleming patents expire; especially so, if the Marconi Company will not accept his company's offer to pay a reasonable royalty, in which case the art will simply have to mark time until the Fleming patent expires.

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DR. WATSON, in England, in the year 1747 transmitted electrical impulses over a circuit two miles long.

## Norwegian Invention of Radio Telegraph Device.

According to a report from Norway, dated May 6, Harmod Peterson, a Norwegian engineer, has recently patented a device for the production of electrical current for radio telegraph transmission which it is stated is based on new principles.

The details of the invention so far received in this country are not complete. Apparently accumulators are used and an automatic means is employed to connect the source of power with the radiating system. It is stated that the system is sparkless and that signal sounds reproduced in receivers are clearer than in present methods. It is claimed, also, that the device is simpler, less expensive, and more durable than equivalent apparatus now widely used for transmission.

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## Pan-American Telegraph Notes.

DOMINICAN REPUBLIC: The Department of Posts and Telegraphs advises that wireless communication is now available to the public between the cities of Santo Domingo and Guantanamo, Cuba, and by cable from the latter place to United States points.

MEXICO: The radio station of the port of Tampico was officially opened, June 1. The station's day range is 500 miles, and the night range 2,000 miles.

PARAGUAY: For the year 1918 the postal and telegraph receipts showed an increase of $100,000 over those of the previous year: 127,892 telegrams were sent and 100,378 received. The School of Radio Telegraphy, which is under the same supervision as the military institute, has graduated two classes, the members of which immediately went into government or state offices; twelve men in all.

ARGENTINA: The government has issued a decree granting a concession to the Siemens-Schubert Company to operate commercially for their exclusive profit for a period of thirty years, a wireless telegraph station capable of communicating direct with cities in central Europe. The station will be equipped with a 400-K.W., Telefunken outfit, radiating continuous waves 10,000 meters or more in length. The tariffs are to be approved by the President of the republic, and the tariff between Argentina and Germany is to be two-thirds less than present submarine cable rates. It is understood that the concession does not imply a monopoly, nor any special privilege whatsoever.

PANAMA: Under a law passed January 28, 1919, there has been established in the city of Panama a general bureau of Posts and Telegraphs, with power to propose, negotiate and conclude treaties and postal conventions with the authorities of other countries, said pacts to be subject to the approval of the executive power.

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## CANADIAN NOTES.

The Great North Western Telegraph Company held its annual commercial conference at the Carls-Rite Hotel, Toronto, on Thursday and Friday, June 12 and 13, during which time important matters tending to increase the efficiency of the service were discussed. The session was attended by: Geo. D. Perry, general manager; A. C. McConnell, secretary and auditor; D. E. Henry, treasurer; S. B. McMichael, general manager, Dominion Messenger and Signal Company; C. W. McKee, district superintendent, Western Union Telegraph Company, St. John N. B.; E. G. Hunter and E. Tennyson, general offices, Toronto; Chas. E. Davies, traffic superintendent; W. J. Duckworth, plant superintendent; Geo. Watt, superintendent of supplies; R. H. Hathaway, superintendent of reports; J. Sullivan, commercial supervisor; J. F. McTaggart, travelling auditor; L. S. Humes, district superintendent, Montreal; W. G. Barber, district superintendent, Toronto; J. G. Davies, district superintendent, Winnipeg; Geo. H. Stead, district superintendent Saskatoon; Jos. Beauchamp, inspector, Montreal; C. W. Dawzy, inspector, Toronto; Geo. Hogarth, commercial manager, Toronto; Lyman Hogarth, commercial solicitor, Toronto; C. E. Lillie, manager, Toronto; J. E. McCann, manager, Montreal; F. D. Boomer, manager, Ottawa; G. C. Vaudrin, manager, Quebec; J. Jamieson, manager, Hamilton; R. J. Foster, manager, London; A. C. Hanley, manager, Kingston; L. D. Winder, assistant manager, Ottawa.

Before adjourning for luncheon on Thursday, Mr. Geo. D. Perry, general manager, was presented with a handsome cabinet of silver. District Superintendent W. C. Barber in presenting the gift said:

"I have been delegated by my fellow officials and workers to speak for them on a matter which has the cordial support and endorsement of each and every one of them. I could wish that the choice of speaker on this matter might have fallen upon someone else,—not because I do not appreciate the honor done me, or because I do not share the feelings of my fellows, for I do appreciate the honor and share those feelings.

"It was with genuine satisfaction that we learned not long ago that you had taken unto yourself a life partner. Not all present are in the happy position of knowing what it means to have someone to turn to for comfort and sympathy when the cares of business—and what business could have greater cares than this business of ours—press too heavily upon him, or to share his joys and pleasures, and find them the keener and more lasting by being so shared.

"It was the intention of the officials to recognize this happy event in the usual manner and at the proper time. It was found, however, in submitting the lists to the different offices, that there was a universal desire, not only on the part of the officials, but also on the part of many other employees to participate. This brought about a change in the program and resulted in an alteration in the inscription on the plate from "Officials" to "Officials and Co-workers". It was also suggested and agreed to that the presentation should be postponed until our commercial meeting in order that as many as possible might be present, particularly those from distant places.

"The opportunity has now arrived, and I take great pleasure on behalf of the officials here assembled as well as those who for various reasons are unable to be present in extending our united wish that a full measure of domestic happiness may be yours; and to give you tangible testimony of the esteem, yes, affection in which you are held by those whose privilege it has been to serve under you, and as a token of the evidence of those feelings, I would ask your acceptance of this cabinet of silver and trust that both yourself and Mrs. Perry may be long spared to share its usefulness."

On Thursday evening, Mr. Perry entertained all those attending the conference at dinner, at the National Club, followed by a motor drive through the city.

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H. HULATT, manager of telegraphs, Grand Trunk and Grand Trunk Pacific Railways, has just returned from a trip to New York, where he attended an executive meeting of the American Railroad Association, Telegraph and Telephone Division, of which he is second vice-chairman.

THE GRAND TRUNK RAILWAY has just completed a very thorough educational tour over the system in connection with the Dempsey Telegraphic Cipher Code as part of the Dempsey Systems. This tour was conducted by Mr. Dempsey under the direction of the code committee, consisting of officials of various departments appointed by the vice-president in charge of operation.

F. T. CALDWELL, superintendent of telegraphs, Grand Trunk Pacific Railway, has resumed his duties at Winnipeg, after serving at the front with the American Expeditionary Forces, vice R. M. McMillan, acting superintendent of telegraphs, who has been appointed commercial and traffic supervisor, with headquarters at Winnipeg.

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THE MANY FRIENDS of Mr. W. G. Barber, district superintendent, Great North Western Telegraph Co., at Toronto, regret to learn of the death of his brother Charles, also of Toronto, until recently connected with the Canadian Pacific Railway.

THE DEATH OF John P. Maguire, well known in Montreal and New York brokerage circles, occurred on June 27, at the home of his sister, Mrs. Charles Houghton, 221 Outremont Avenue, Outremont, Que., following a paralytic stroke. Mr. Maguire was a telegraph operator connected with Montreal and New York large brokerage firms for several years. He had also been connected with the C. P. R. and G. N. W. telegraph companies. He is survived by his two sisters, Mrs. Charles Houghton and Mrs. J. P. O'Leary of Montreal. The funeral took place on Sunday, June 29. In-

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terment was at Quebec City, where Mr. Maguire was born 62 years ago.

### Vancouver, B. C., Notes.

The staff of the Canadian Pacific Railway Company's Telegraph main office in this city includes the following named gentlemen: R. N. Young, superintendent; H. M. McIntyre, inspector; Allan Clark, manager; J. W. Baker, chief operator; J. J. Schetgen, wire chief; Dan McLaren, traffic chief; W. Jamieson, night chief operator; W. A. De Cow, all night chief operator. The operating staff consists of: W. Calder, A. Cooper, W. N. Nelson, W. J. Hearsch, C. Prushaw, Z. T. O'Connor, E. F. Johnson, E. Parker, T. P. Masters, H. S. Cunningham, J. W. McKinnon, W. D. Brine, J. B. Ross, sr., A. Tennant, M. Cummings, J. W. Taft, E. F. Bailey, W. C. Boyle, R. F. Pollard, P. Conway, W. C. Savage, D. S. McKenzie, E. C. Leslie, D. McLean, F. Worsley, R. E. O'Brien, R. Gemmell, J. Lawlor, J. V. Diehldal, C. Parker, J. T. Brooks, J. Ross, jr., B. Clee, D. H. Patterson, L. E. Hamson, L. H. Earle, and Mrs. Coyle. In the Morkrum department: W. R. Tate, supervisor; E. Agranove, assistant supervisor; and the Misses Mathewson, Stewart, Polley, Shannon, White, Wymess, Williamson, and Williamson, operators. "Griff", also, is still with us and works three eight-hour shifts every day.

In the service of the Pacific Cable Board, G. W. Carr is officer in charge, and on the staff: Messrs. J. B. Clark, D. McNair, J. W. Barnes, H. E. Nixon, E. C. Bolin, D. A. Barr and W. C. McCormick

J. M. BARNES. Chief Operator, Canadian Pacific Railway Company's Telegraph, St. John, N. B., who has been a subscriber to this publication for over twenty years, in remitting to cover another twelve months' subscription, writes: "The telegraph fraternity is certainly indebted to you for such a helpful journal as the TELEGRAPH AND TELEPHONE AGE. May it long be spared to continue the good work."

EDWARD TODD of Owen Sound, Ontario, one of the oldest Great North Western Telegraph Company agents in Canada, died recently at Bradentown, Fla., where he had spent the winter, at the age of 88 years. Mr. Todd was the first Great North Western agent at Owen Sound, being appointed in 1866, and was for years the only operator. He ran the office in connection with a stationery business, and later branched out as a newspaper publisher, being proprietor and editor of the Owen Sound *Times* for ten years. He retired to private life some years ago. Mr Todd leaves a widow, two sons and two daughters, one of the latter residing at Bradentown, Fla.

### Such Is Luck.

Clerk—We can't pay you the $25 on this money order until you are identified.

Man—That's tough luck! There's only one man in town who can identify me and I owe him $20.

—*Boston Transcript.*

### Multiplex Telephony in Canada.

Recently the Canadian Independent Telephone Company carried out an interesting experiment over the Toronto-Dundas telephone line of the Ontario Hydroelectric Power Commission. Due to the operating conditions in this district the ordinary metallic system has become very indistinct and frequently quite useless. The experiment was in charge of Dr. Lee de Forest, with Prof. C. A. Culver and his staff.

The demonstration was carried on over a pair of telephone wires extending from the power station at Toronto to that at Dundas, near Hamliton, a distance of over 40 miles. The apparatus was arranged at the power stations, and tests were made over the three miles of cable extending from the power station at Toronto to the central office of the Hydro-electrical Commission. These tests showed that the presence of the three miles of cable caused no appreciable attenuation to the service. Two complete transmitters and receivers were installed at each end of the line. Four distinct wave lengths were employed, ranging from 16,000 to 12,000 metres. Additional tests were made, using wave lengths of 600, 1,000 and 1,600 metres. Contrary to all expectations, the results obtained with the higher frequencies (the highest being 500,000 per second) were even better than those one-twentieth as great. The demonstration showed by actual trial that at least seven simultaneous conversations could be carried on without interference of one with any other, and without in any way disturbing the physical circuit. The existing conditions of the line were not disturbed in any way except by momentary interruption while choking coils were being introduced. It was found later that these choking coils were not necessary. The quality and loudness of the speech left nothing to be desired. Simultaneous talking and listening was carried on the same as over an ordinary telephone circuit, no switch-over device being employed. The success of the demonstration using these high frequencies, so new to the wired telephone art, upsets a good many preconceived and orthodox notions of the limitations of telephone operation and engineering. Thus with two pairs of wires, 60 independent telephone conversations can be carried on without using the earth, and with earth connections six additional circuits can be provided which should be suitable for telegraph purposes. Over each of these latter circuits it would be possible to carry on ten additional telegraph communications suitable for high-speed work. It has been demonstrated that for this form of telephone communication galvanized iron wires answer admirably. There is no question but that most power transmission conductors can be used for telephone purposes as well.

THE FIRST hotel electric annunciators were installed in a hotel in New Orleans, La. The system was devised by Charles S. Buckley. That was in the year 1858.

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## RADIO TRANSMISSION FORMULAS FOR ANTENNA AND COIL AERIALS.

In a technical communication shortly to appear as a scientific paper of the Bureau of Standards, J. H. Dellinger presents the formulas shown herewith, derived by him about two years ago, and since that time found useful in Signal Corps and Navy work.

Either the equations as here given or the component equations giving the field produced by a given antenna or coil aerial and the received current produced by a given field, lead to the solution of questions of design which it would be difficult to settle by experiment. Such quantitative experiments as have been made verified the formulas to 25 per cent. or better, some observed values of received current being higher and some lower than the theoretical values.

The aerial of a radio transmitting or receiving set is either a condenser or an inductance coil of large dimensions. It effects the transfer of power between the radio circuits and the ether. The coil aerial has the inherent advantage of serving as a direction finder and interference preventer, but is less effective quantitatively as a transmitting or receiving device than the condenser aerial commonly called the antenna. The practical question, how far can communication be maintained by a coil in comparison with an antenna, is answered by the following formulas, derived from electromagnetic theory. A flat-top antenna is considered, and a rectangular coil. Let $h$ = height of antenna or coil, $l$ = horizontal length, and $N$ = number of turns of wire of coil aerial, $I$ = current, $\lambda$ = wave length, $d$ = distance apart of transmitting and receiving aerials, $R$ = resistance of receiving aerial circuit. The subscripts $s$ and $r$ refer to sending and receiving, respectively. All lengths are in meters.

Antenna to antenna:

$$I_r = \frac{188.\ h_s\, h_r\, I_s}{R\,\lambda\, d}$$

Antenna to coil:

$$I_r = \frac{1184.\ h_s\, h_r\, l_r\, N_r\, I_s}{R\,\lambda^2\, d}$$

Coil to antenna:

$$I_r = \frac{1184.\ h_s\, l_s\, h_r\, N_s\, I_s}{R\,\lambda^2\, d}$$

Coil to coil:

$$I_r = \frac{7450.\ h_s\, l_s\, h_r\, l_r\, N_s\, N_r\, I_s}{R\,\lambda^3\, d}$$

The actual current received when a coil aerial is used is frequently greater than the formulas indicate, because such an aerial acts both as a coil and as an antenna by virtue of its capacity to ground. This double action of the coil structure is likewise indicated by values obtained for radiation resistance and by the observed directional properties.

The use of the coil aerial is particularly advantageous, as may be seen from the formulas, for short waves. In most cases the usefulness of the coil aerial increases as its dimensions are made to approach the order of magnitude of the wave length. An advantage of the coil not apparent from the formulas is that its resistance can usually be made lower than that of the corresponding antenna.

## New Telephone System for Republic of Czechoslovakia.

The Republic of Czechoslovakia (comprising Bohemia, Moravia, Silesia, and Slovakia) plans to remodel, enlarge, and re-equip its telephone system. For this purpose a mission consisting of representatives of the Department of Post, Telephone, and Telegraph, and experienced engineers will be sent to the United States to study and report on the various systems, switchboards, apparatus, appliances, etc., and recommend what in their opinion would best suit the conditions in the new Republic.

The United States with its network of telephones is recognized as positively the best field for such research, the ultimate object of which is to place contracts for a complete and thorough telephone system, providing service not only for the territory of the Republic, but also taking care of its needs as the leading country of Central Europe, through which runs the great trunk line of railway connecting Hamburg, Prague, Vienna, and Trieste, and where important development of waterways and railways is destined to take place in uniting the North Sea countries with South Poland and the Ukraina, the upper Elbe (Labe) and Oder (Odra) with the Danube, and Czechoslovakia with Hungary, Roumania, and Jugoslavia.

## Equipment Used by the Signal Corps During the War.

During the late war a single order for a certain kind of insulated wire was in sufficient amount to extend fourteen times around the earth. The cost of field glasses alone exceeded $40,000,000, and wrist watches for Signal Corps operators reached a total of above 43,000 watches. Over one million cells of battery were used, and 285,000 vacuum tubes for radio amplifiers were supplied. Over 100,000 telephones for field use. 200,000 wire pliers, and 8,000 of one type of radio apparatus were produced and shipped to France.

## Value of Amateur Radio Apparatus Sold in the United States in One Year.

In the year 1914, before governmental restrictions were placed upon Amateur radio operation and experimentation, the value of the apparatus sold to amateurs in the United States amounted to $672,600.

IN THE YEAR 1749 Benjamin Franklin, of Philadelphia, identified electricity and lightning as having common characteristics.

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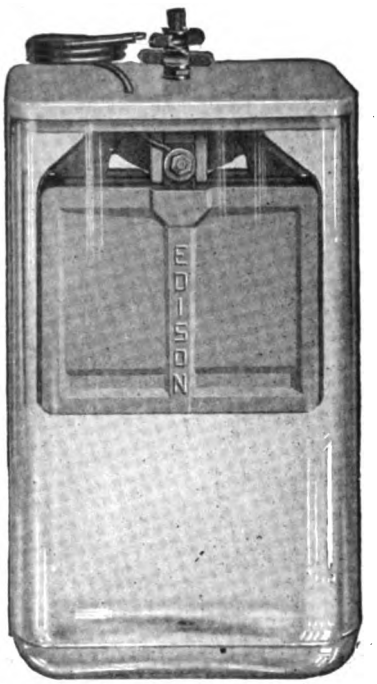
# FOR CLEAR TRANSMISSION

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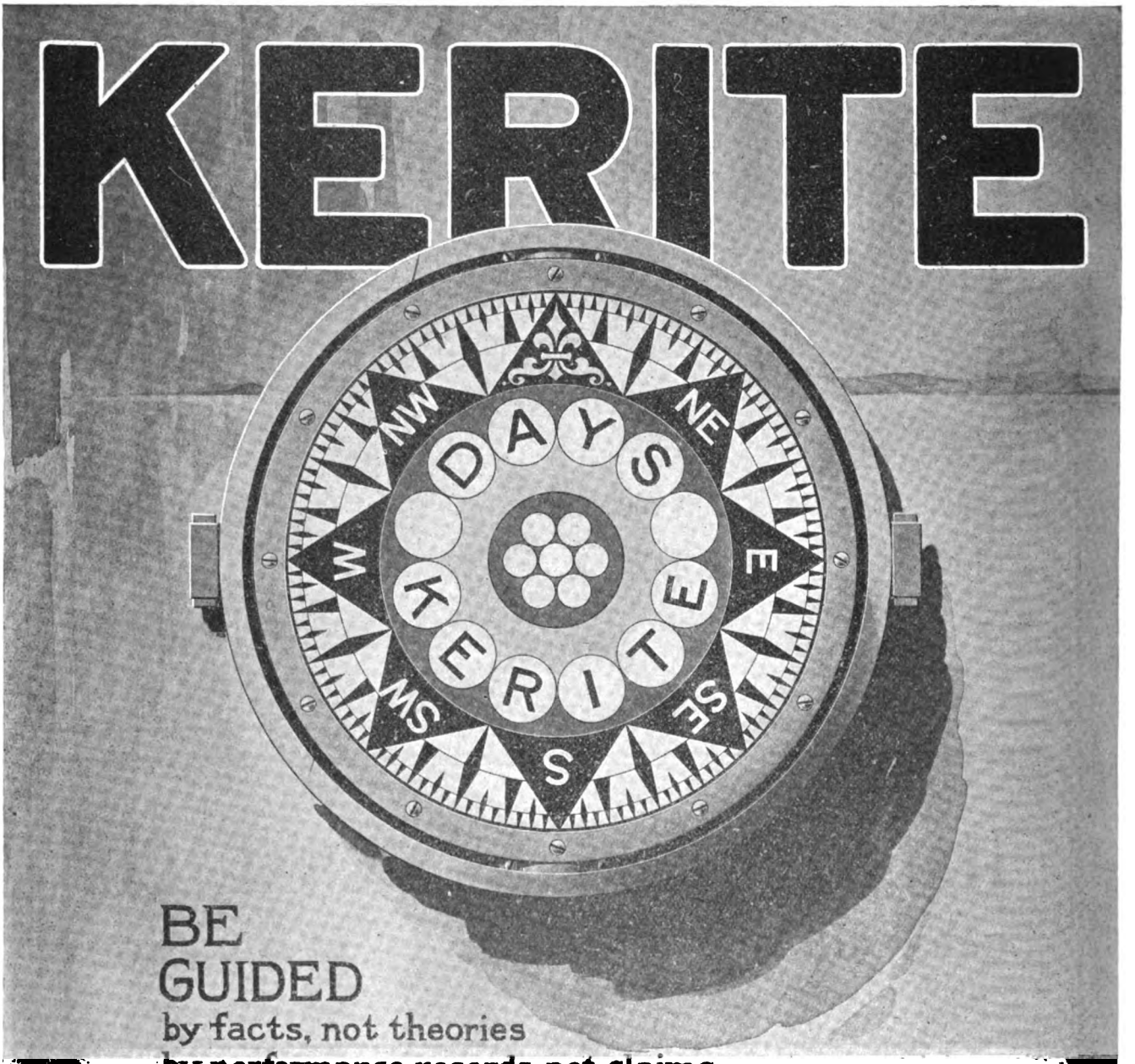


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## THE RAILROAD.

### New Soo Line Office at Stevens Point, Wis.

Under the supervision of G. H. Mayer, superintendent of telegraph of the Minneapolis, St. Paul and Sault Sainte Marie Railroad, a new telegraph office was installed recently at Stevens Point, Wis.

Stevens Point is a division terminal office and the following officers of the road have their headquarters there: Division superintendent, trainmaster, resident engineer, roadmaster, and superintendent of telegraph.

The second floor of the building is used as division offices.

The telegraph wires enter through an underground lead cable, and protected on the cable pole with Western Electric 93-A protectors. The office equipment is protected with Western Electric 96-A protectors.

Wires distribute from a 96-A protector to Western Electric 2-C porcelain blocks. Office loops distribute over the main frame from 2-C porcelain blocks. Cord circuits distribute from the main frame to 2-C porcelain blocks mounted behind the switchboard.

The switchboard is of a spring-jack peg type. 150 ohm Morse relays and 400 ohm sounders are used. Generator current is used; 160 volts, three machines, one positive, one negative, and one spare.

The current for the dispatchers' telephone circuits is furnished from motor generator sets. Two of the generator sets are installed and run on twelve hour shifts. The generators are all in the telegraph office. The switchboard for the telegraph generators is also in the telegraph office. The switchboard for the dispatchers' telephone generator is in the dispatchers' office, so the dispatcher can watch the voltage of the generators and regulate the current without leaving the office.

Three telephone dispatching circuits are operated: one from Stevens Point to Minneapolis; one from Fond Du Lac to Stevens Point, and one from Fond Du Lac to Chicago. These circuits are simplexed, the simplex supplying one through telegraph circuit from Minneapolis to Chicago.

### The Telegrapher and His Camera.

Telegraph, cable and radio men either possess or desire to possess good cameras. One of the largest and most reliable camera photographic supply houses in New York, C. G. Willoughby, Inc., 110 West 23d Street, was founded by an ex-railroad telegrapher, who has built up a large business by fair dealing.

The Willoughby company carries a complete line of modern photographic supplies, including motion picture apparatus, and the present prices are the same as those prevailing before the war. All of the high grade work done by the telgrapher-artist, W. H. Schlaefer, has been done with Willoughby instruments and materials.

### The New Oil Discoveries.

W. D. Gregory of El Paso, Tex., an old-time telegrapher, now an oil broker in that city, whose advertisement is printed on another page of this issue, is enthusiastic over the outlook of the Texas oil fields. He rejoices in the fact that many of his old telegraph friends have joined forces with those of the Texas citizens who are great believers in the future possibilities of the Texas oil gushers.

Mr. Gregory says: "Probably a majority of our customers are figuring on making a spread of their oil investments. This is a good and safe plan. It is never wise to risk all in one venture of any kind, no matter how safe it appears to be.

"In the favored districts, over 80 per cent. of the wells drilled are coming in with an average daily production of over 400 barrels each. When it is realized that one well of average production is sufficient to yield 100 per cent. per annum on a $200,000 capitalization, it can readily be seen what the chances are for good returns from an investment in these fields where gushers, flowing thousands of barrels per day, are not uncommon.

"The opportunity for moderate or small investors and the general public will soon pass, as the old-line oil corporations are rapidly absorbing the best acreage in all the different proven fields. While it lasts it is one of the best chances for quick and large returns ever known.

"Like in all cases of suddenly discovered source of wealth, many unprincipled people will use these amazing fields of gushing oil as a basis for operations intended more to get the public's money than to get oil. No amount of dishonest practice can, however, obscure the fact that there is plenty of oil waiting for faithful and able effort to bring it to the surface.

"With the prevailing conditions it only remains for investors to make sure of following the leadership of men of well known business sagacity and honorable reputation.

"El Paso is the center of activities in west Texas, New Mexico and Arizona. We are brokers, not promoters. Your interest is our interest. We are here on the ground with access to the counsel and advice of the best among the leaders in business and financial circles. We have already started a host of clients well on the way to success."

"REMCO"
ALTERNATING CURRENT SELECTORS
(Controlling Patents)
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RAILWAY ELECTRIC MANUFACTURING CO.
250-252 West Water St. MILWAUKEE, WIS.

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# Universal Duplex Apparatus

## In Use By the Western Union Telegraph Company

*(Continued from page 351, July 16 issue.)*

DIFFERENTIAL WORKING.

Fig. 4 shows theoretically the complete circuits of the repeater when working differentially on both west and east sides. Signals are received over the west line by the windings of the combination relay on that side of the set. This relay operates in turn the repeating relay. The contacts of the repeating relay are connected to the main line generators of the "east" set. The armature of this relay connects the split point of the east side of the repeater to either positive or negative main line current depending on whether the armature is on its spacing or marking contact, and thus repeats into the east line all signals received from the west. Similarly, signals received over the east line will be repeated by means of the east main line combination relay and repeating relay to the west line.

The connection between each repeating relay and the split point of the opposite side of the repeater is carried through a three-point switch mounted on the same base with a pole-changer key. When these switches are thrown to the right, the split points are disconnected from the repeating relays and instead connected to the levers of the pole-changer keys. The repeater is thus "cut" and the attendant can signal in either direction by operating the pole-changer key on that side of the repeater. Another three-point switch separately mounted is provided on each side of the repeater, by means of which the split point on that side may be disconnected from the main line potentials and instead connected to ground through a 400 ohm resistance.

Leak circuits are provided to enable the attendant to determine the character of the signals passing in either direction. As will be seen from the diagram, the armature of each repeating relay is connected through a polar leak relay and a high resistance to ground. The direction of current through this leak relay will, of course, be controlled by the position of the repeating relay armature and, as a result, the leak relay will operate in response to the repeated signals. Each leak relay controls a local circuit containing a reading sounder and a repeating sounder. The latter, in turn, may operate a selector in response to a special code signal and thus light a signal lamp to call in the repeater attendant.

When the repeater is used for repeating signals at high speed, the reading sounder operated by the leak relay cannot be relied upon as an indication of the character of the signals passing through the repeater. For this reason, a sensitive recording instrument, as for example. an undulator, is necessary in such service. This undulator is terminated on a double conductor cord and plug and each leak circuit is carried through a jack into which that plug may be inserted, thus connecting the undulator in series with the leak relay and the leak resistance. By means of auxiliary contacts on the leak jacks, a mil-ammeter is also connected into the leak circuit at this time, thus enabling the attendant to determine the value of the current passing through the leak apparatus and, if necessary, to regulate the leak resistance accordingly. This mil-ammeter is also useful in automatic circuits as an indicator of the character of the signals transmitted. When current reversals of equal duration are being received at the repeater and repeated without bias, the mean between the extreme right and left throws of the mil-ammeter needle will lie at the center or zero of the scale. If this mean, however, appears to the right or to the left of the zero point, it is an indication that reversals biased respectively toward "marking" or toward "spacing" are being transmitted. The differential mil-ammeter in the main line circuit indicates in a similar manner whether incoming reversals are biased, and a comparison of the two meters will assist in properly adjusting the transmitting relay. As will be explained later under the heading "Balancing," it is sometimes desirable to bridge the undulator across the main and artificial lines of either side of the repeater, and for this purpose the bridge jacks WBJ and EBJ are provided to receive the undulator plug. As it is undesirable to have the undulator bridged while the repeater is in operation, each of these bridge jacks is equipped with auxiliary contacts so arranged as to open the connection between the repeating relay on that side of the repeater and the split point on the other side of the repeater whenever the bridge jack is occupied by the undulator plug. This arrangement makes it impossible to cut the repeater through for service should the undulator plug be accidentally left in either east or west bridge jacks.

Main line current is supplied to each side of the repeater by means of a patching cord between a jack connected to the repeater and another jack connected to the blades of a double-pole, double-throw knife switch. When this switch is thrown to its lower position the repeater will then be connected to its normal working potentials, and when in the upper position to a higher potential. Between the blades of the knife switch and the battery jacks each of the potential leads is carried through a tungsten lamp which is mounted on a lamp standard on the upper shelf of the repeater table. In case of a short circuit of the potential leads, such as might result from arcing at the repeating relays contact, these lamps will glow, thus calling attention to the trouble. A double pole snap switch is connected in the potential leads running to each re-

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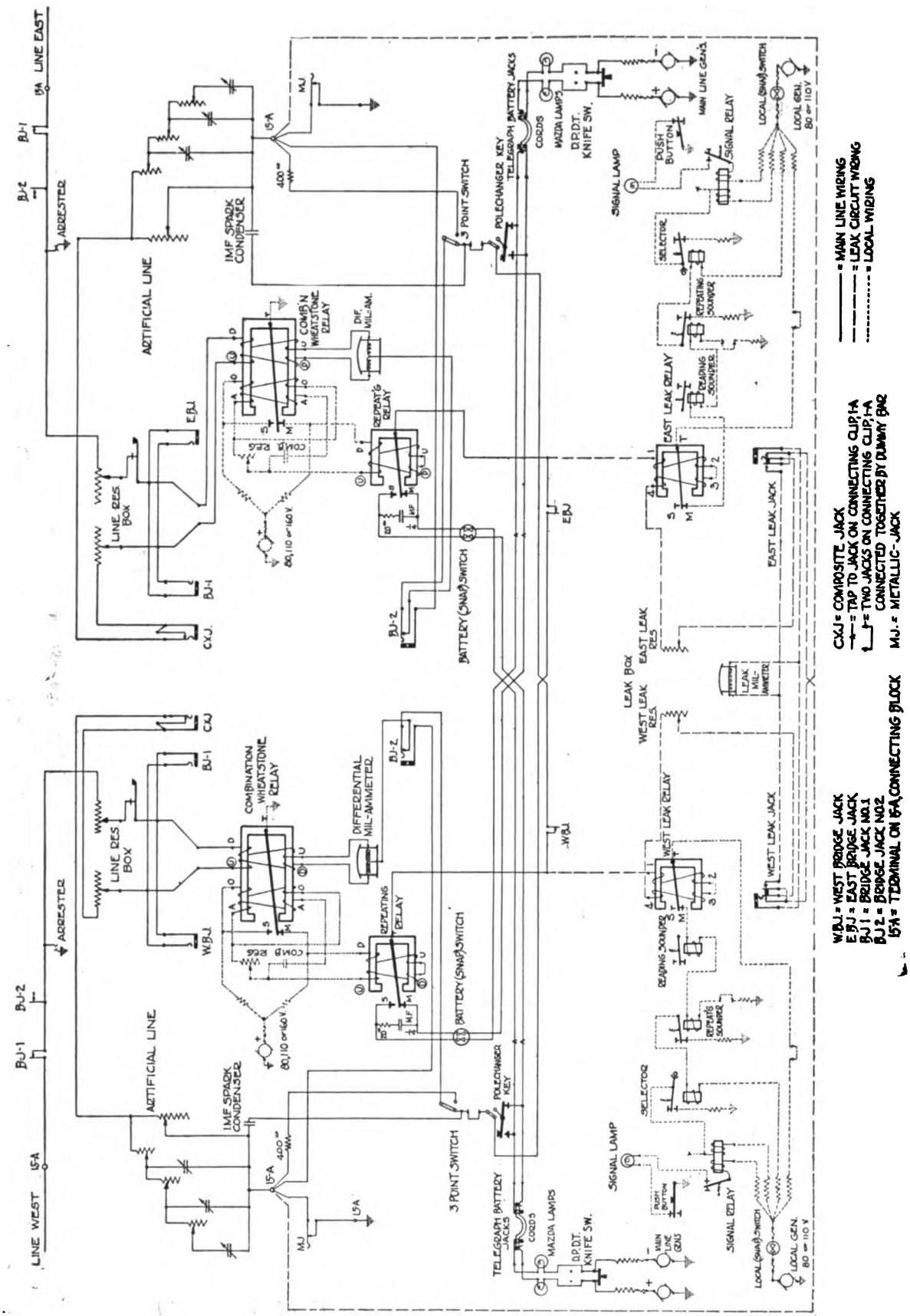


Figure 4.

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peating relay so that the main line potentials can be removed from that instrument when necessary. For "differential" working the repeater must be used exclusively on telegraph wires, the connections being so arranged that any attempt to operate differential over other than telegraph wires will render the repeater inoperative.

### BRIDGE WORKING.

Where it is necessary to operate the repeater over telephone lines, the set must be arranged for "bridge" working. For this purpose, the jacks marked respectively BJ-1, BJ-2 and CXJ are provided on all sets as shown in Fig. 4. In addition a "telephone" adapter must be provided. This adapter comprises the necessary "bridge" arms, and also the extra inductance and capacity required for "composite" working, together with the necessary jacks to patch to those of the repeater. As shown in Fig. 5, patching cords from jacks BJ-1 and BJ-2 to the adapter remove the combination relay and the differential mil-ammeter from the split and place these across the bridge arms which, as explained in the specifications for the Installation and Operation of Terminal Duplex Sets, comprise a "retardation coil, type WE-5-U," the split connections being taken from the middle of this retardation coil.

Because of the necessary limitations of voltage to be applied to telephone wires, the patching cords which connect each side of the repeater to the main line potentials must, in this case, be transferred to a different battery jack than was used for differential telegraph working. This is connected to potentials of lower value than is the telegraph battery jack and the potential leads are not passed through the double-pole, double-throw knife switch or the tungsten lamps previously mentioned. Each of these telephone leads is, however, equipped with a resistance lamp which will glow in case of a short circuit or other trouble, and thus serve the same purpose as the tungsten lamps in the telegraph potential leads. In order to avoid the application of excessive potentials to telephone wires, the line connections for using such wires are carried through auxiliary contacts on the telephone battery jack and on the jack BJ-1. These contacts can be closed only by setting up the connections described above for bridge working on telephone lines with the lower voltage mentioned..

In addition to the bridge jacks BJ-1 and BJ-2, a third jack CXJ, is provided and the artificial line carried through this jack on each side of the repeater. By connecting this jack by means of a short patching cord to the telephone adapter, a retardation coil WE-5-W is connected in series with the artificial line apparatus and a six microfarad condenser connected in parallel with the combination. This retardation coil and condenser are necessary when working over composite circuit to compensate for the composite apparatus. This latter connection is not shown in Fig. 5, as it is assumed that, in both cases, the telephone line being used will be operated by the simplex method of simultaneous telephony and telegraphy.

### DIFFERENTIAL WORKING ON ONE SIDE, BRIDGE WORKING ON THE OTHER.

In case a duplex operated over a telephone line by the simplex or composite method of simultaneous telegraphy and telephony is to be repeatered into a line used exclusively for telegraph service, the part of the set on the telephone side may be arranged for bridge working, as already described, while the other part of the set is arranged for differential working. No drawing is shown for this type of repeater, but it will be evident from a study of Figs. 4 and 5 that no difficulty will be encountered in the arrangement.

### TERMINAL WORKING.

In the actual wiring of the sets, a number of the connections indicated in Figs. 4 and 5 are carried through lugs on a connecting clip normally connected together by means of strapped lugs on a dummy bar. When it is desired to work the repeater as two terminal sets, this dummy bar is removed and a leg adapter placed on the table. This leg adapter is equipped with lugs to engage those of the connecting clip upon the repeater table and connect the repeater apparatus to the apparatus on the adapter.

### INTERMEDIATE STATION WORKING.

It is sometimes desirable to arrange the apparatus at the repeater station on a duplex circuit so that an operating table position can be connected to the repeater, permitting the receiving of all messages passing through the station and the sending to either or both terminals. The repeater station, however, cannot send to one terminal when the other terminal is sending, as this would require the simultaneous transmission of two messages in the same direction over a portion of the circuit, which is impossible by the duplex method of telegraph operation.

To include a "drop" at the repeater station, a leg adapter wired somewhat differently from that used when operating the repeater as two terminal sets is provided. In this special leg adapter no connection to the negative or "marking" current supply is provided, but instead the front contact of each pole-changer is connected to the armature of the repeating relay on the other side of the set; *i. e.*, to the relay which would in repeater operation supply current to the same line circuit as that pole-changer.

### METALLIC WORKING.

With any of the different arrangements described, either or both sides of the repeater may be so connected that the main line circuit comprises two line wires forming a metallic loop, instead of the usual method of employing one line wire with a ground return. For this purpose a so-called metallic jack (MJ) as shown in Figs. 4 and 5, is provided. The return from the artificial line is brought to the tip spring of this jack, the second telegraph line is brought to the sleeve, and a ground is brought to the normal contact.

*(To be continued.)*

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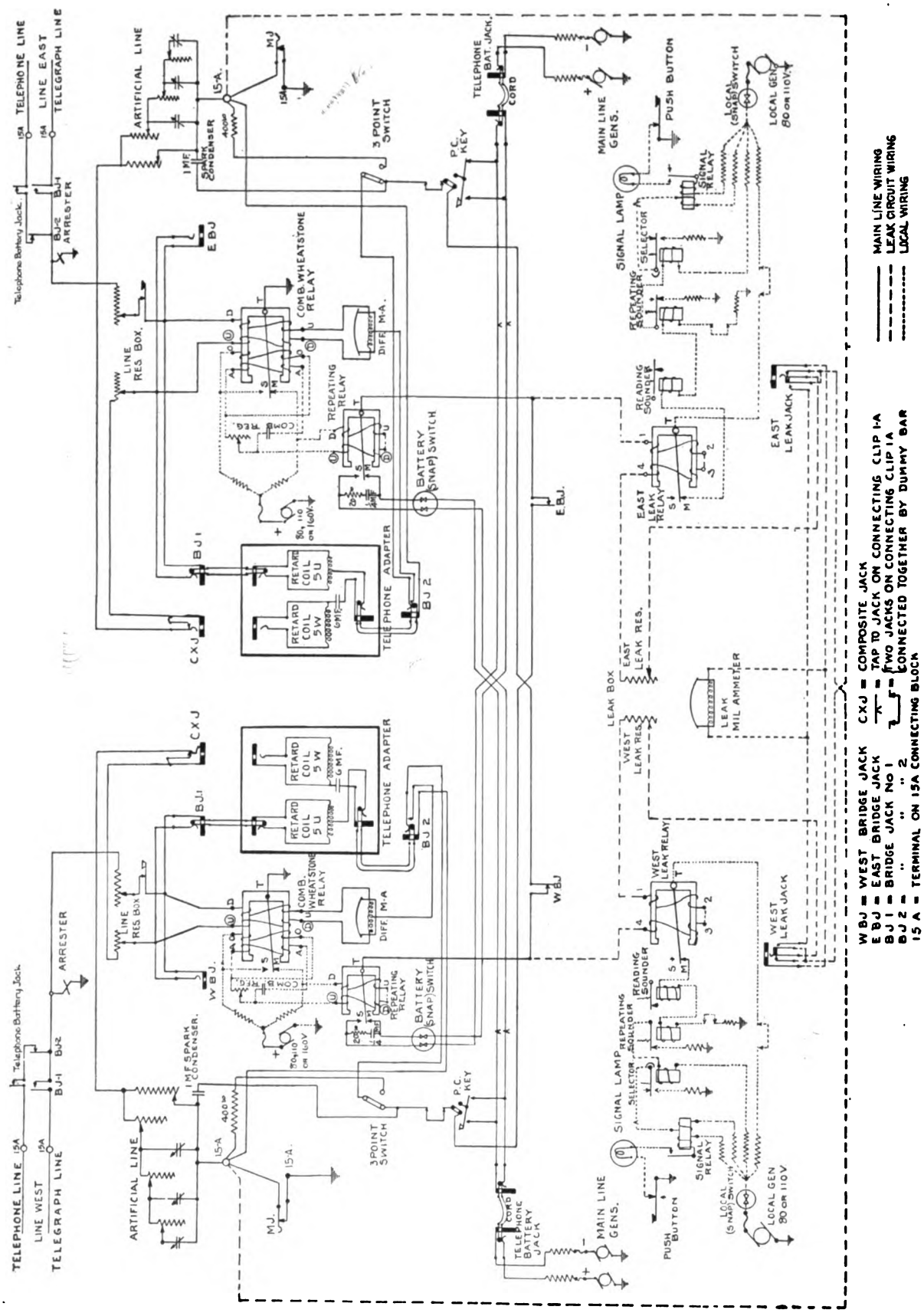


**Figure 5.**

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## TELEGRAPH AND TELEPHONE COMMITTEE'S REPORT.

At the annual convention of the American Institute of Electrical Engineers, held at Lake Placid, N. Y., June 24-27, the following report was presented by the Institute's telegraphy and telephony committee. The report briefly reviews the developments in telegraphy, telephony and radio during the past year:

A noteworthy development during the past year has been the drawing together of the arts of telegraphy, telephony and radio signaling into one subject of Electrical Communication. War conditions have very materially aided this tendency. The enormous increase in traffic, due to the war, made it imperative that each method of rapid, long distance communication be developed to its utmost capacity.

With the entry of our country into the war, the requirements of the military and naval authorities imposed a certain amount of concentration in the direction of communication facilities, and, when on July 31, the Postmaster General was empowered to take control of all telegraph and telephone lines in this country, unity of direction was further advanced.

On December 1, the facilities of the two large commercial telegraph companies were consolidated, and on December 4, the marine cable systems of the various cable companies were taken over by the government.

From an engineering standpoint these developments had a retarding effect upon the plans of the private companies for apparatus and construction improvements; but several Boards appointed by the government were given opportunity to experiment with suggested technical improvements, and to distribute traffic loads where they might be moved in the most expeditious manner possible over the lines of the combined systems.

### STANDARDIZATION

During the year a considerable amount of contributory work has been done along the line of standardizing telephone, telegraph and radio terms, and symbols.

### RAILROAD COMMUNICATION

The Association of Railway Telegraph Superintendents was, during the year, absorbed by the American Railroad Association, but the engineering work carried on by the Association has not been neglected by the railroad telegraph and telephone officials. Indeed, the manager of the Telegraph Section of the Railroad Administration has been enabled to coordinate technical effort to the end that the railroads will undoubtedly benefit from the work done by technical committees.

### LIGHTNING PROTECTION

During the year considerable improvement has been made in the design of lightning protective apparatus used to safeguard telegraph and telephone lines from lightning and accidental contact with foreign wires carrying higher potentials than the signaling circuits. The vacuum type of arrester has been improved in effectiveness and reliability.

### PRINTING TELEGRAPHS

On the lines of the Western Union Telegraph Company the use of the multiplex printer system has been considerably extended. About 80 per cent of this company's wire traffic is now handled by means of the Multiplex, and the Morkrum printer duplex systems. The Postal Telegraph-Cable Company, on the other hand, which has experimented during the past twelve years with three different printing telegraph systems, on April 1, 1919 discontinued the use of printing telegraphs on all of its lines, reverting exclusively to the Morse manual system.

### SUBMARINE CABLE SIGNALING

During the past year considerable improvement has been made in the traffic carrying capacity of submarine telegraph cables. The application of the cable relays and amplifiers invented by Heurtley, Dixon, Brown, Gulstad, and Bruce, to cable operation, has made longer direct-working possible, and has resulted in increased speeds in words per cable in unit time. On the cables operated by the Western Union Telegraph Company between Hearts Content, Newfoundland, and Valentia, Ireland, the printing telegraph system has been applied with satisfactory results.

[The following contributions to this report are submitted by the members of the Committee whose names appear under the various subheads.]

### TELEGRAPH LINE CONSTRUCTION

*R. E. Chetwood*

No radical changes in the design or type of telegraph construction have been made during the past year. There has, however, been a decided tendency towards stronger construction, both for the pole line and for the wires. Stronger pole line construction has been obtained by using more poles per mile of line, by using stronger poles and by the use of as short poles as right-of-way conditions will permit.

Developments in the telegraph art which lessen the harmful effect on telegraph transmission of the high electrostatic capacity of conductors in cables have permitted the use of aerial and underground cables to a somewhat larger extent than formerly. Stronger and more reliable construction has thus been obtained in and near cities where, on account of right-of-way conditions, it is often necessary to carry the wires of two or more pole lines on one line.

As iron wire is a satisfactory conductor for many classes of telegraph circuits, both with manual or with automatic operation, a considerable increased strength in line wires has been obtained by using iron wires of large size, such as No. 4 and No. 6 B. w. g.

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### INTERFERENCE TO COMMUNICATION CIRCUITS FROM NEIGHBORING POWER LINES

*A. W. Copley*

A mutual interchange of information and co-operative work between power companies and communication companies toward the solution of inductive interference problems in particular cases, has resulted in improved conditions, and at the same time, caused the maintenance of friendly relations between the parties.

Conditions obtaining on the power circuits during regular operation are given the greatest attention working out the solution, as serious interference under such conditions is intolerable. Abnormal transient conditions, such as short circuits on the power lines, are of comparatively infrequent occurrence and short duration, and if protection of the communication circuits against interference at such times were to be generally attempted, the cost and inconvenience of the arrangements would be out of all proportion to the benefits gained. It is, therefore, considered reasonable to protect only against physical damage to the property or personnel of the communication company under such abnormal conditions.

For the prevention of interference in telephone circuits under operating conditions, co-ordinated transpositions of the power and telephone circuits give a solution in most cases. Wave-form correction in the power circuits by resonant shunts or other means, may sometimes be resorted to, especially when transpositions are impracticable. There has been no standard in the past by which the tendency of a machine to cause telephone interference could be measured. The new telephone interference factor now defined in the Standardization Rules provides a measure of this tendency and its use will assist in the adjustment of interference difficulties.

Telegraph interference from transposed power circuits is so small as to be negligible, except during abnormal conditions. In cases of interference from power lines which cannot be transposed, such as trolley circuits, the use of resonant shunts in the telegraph circuits has given very good corrective results. Much has been accomplished in the prevention of interference from such circuits by a careful layout of the power system, particular regard to substation locations being given, so as to minimize the inductive interference in the communication lines.

### LONG DISTANCE TELEPHONE TRANSMISSION

*O. B. Blackwell*

The features of perhaps greatest general interest at this time in long distance telephone transmission are telephone repeaters, loading, and multiplex telephony.

The vacuum tube amplifier has been highly developed for use in telephone repeaters and has become the preferred form of amplifier for such use. The transmission gains which may be obtained with such an amplifier in two-way operation depend in each case on the electrical conditions of the line in which used. This has had a large effect on cable and line construction.

In the loading art it has required the development of coils having especially great magnetic stability and uniformity. Such electrical stability is also particularly important on long circuits which are composited for Morse operation to prevent the telegraph interfering with the telephone transmission.

The repeater and loading developments have considerably extended the use of telephone cables for long distance transmission. They have, however, made it imperative to keep open wire circuits as free as possible from cable in order to prevent such electrical irregularity from reacting on repeater operation.

A multiplex telephone circuit has been put into commercial use between Baltimore and Pittsburg, giving four circuits over a single pair of wires in addition to the ordinary telephone circuit over the same pair. This multiplexing depends on the use of "carrier currents." In order, however, to be effectively transmitted over telephone circuits, these carrier currents are of comparatively low frequency and the ratio between them and the telephone frequencies being transmitted is, therefore, low. This brings in peculiar problems in the handling and separating of these different frquencies on the one pair of wires.

The vacuum tube plays an important part in this system, not only as an amplifier but also as a modulator and demodulator. The transmission of these frequencies over telephone circuits makes more severe requirements on the circuits than do ordinary telephone frequencies in view of their larger attenuations, the greater effect on them of lengths of cable and their increased tendency to crosstalk. The multiplex system promises to have a considerable field in comparatively long distance telephone service.

### TELEPHONE OUTSIDE PLANT PRACTICES

*W. R. McGovern*

At the present time the best practice in outside plant construction is represented by an all cable and twisted pair distribution in the medium and large exchange districts. In the small exchanges where estimates of future growth do not show the need along any given route for more than from 10 to 15 circuits, it is more economical to use crossarm construction with galvanized wire. Even in these exchanges it is desirable to place a small amount of cable in the immediate vicinity of the exchanges.

In those exchanges where cable and twisted pair wire are used, the cable portion of the plant should be so designed, and supplied with distributing terminals, that the amount of twisted pair wire is held at a minimum. In thickly populated areas the twisted pair wire should appear only as the connecting link between the pole route and the subscriber's premises.

The dividing line between the underground and the aerial portion of the cable plant is a variable determined by local conditions, but in general the circuits should be placed underground, if estimates of

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growth for several years in the future show that they will exceed a few hundred in number.

Among the tendencies of telephone construction is the more extended use of fine-wire cable, it being theoretically practicable to use 24-gage, or smaller circuits in the zones near the exchanges. The use of small-gage wire in the aerial cable plant will result in economy; and a more extended use of fine-wire cable in the underground plant will conserve conduit space as well.

Another tendency is towards the use of cable terminals of such a type that potheads are unnecessary. The so-called sealing chamber type of terminal allows paper cable to be taken directly into the terminal, and its use will become more extended in the future.

### STATUS OF AUTOMATIC TELEPHONY

*Arthur Bessey Smith*

There is at the present time a general recognition that automatic telephony has arrived. It has been established that automatic switching is very flexible, offering a number of solutions for every traffic problem.

The switching apparatus has become fairly well standardized as to mechanism, electrical circuits, processes of manufacture and maintenance. The recent trend of development has been along the line of increasing the factor of safety, making more definite the standards of adjustment, and increasing the life of parts subject to wear.

Automatic switching is a recognized efficiency device for many classes of service. The private automatic exchange is widely used in commercial institutions, either isolated or with trunks to the public system. It is maintained by ordinary electrical employees.

The rural automatic telephone has become firmly established. It is served by party lines from a city central office or from a small switchboard at the center of the rural area. Common battery is successfully used for voice transmission as well as for dialling.

Single office and multi-office exchanges up to 70,000 lines are in use and have proved their adequacy. The application of automatic switching to metropolitan areas is a recognized possibility.

The automatic switching of toll lines is established. It is possible to dial directly from the originating toll board to the called party's telephone. This has increased the time-efficiency of toll lines.

### ARMY SIGNALING

*E. B. Craft*

The telephone has become an essential part of the modern war mechanism. Because of the vast territory and enormous masses of men involved in military operations of the past four years, the military telegraph has assumed an entirely new character.

We now find networks of wires and cables reaching from all points of the fighting zone back to bases of supply often hundreds of miles away. These networks make use of the most modern developments of the communication art, such as high speed printing telegraphs and telephone repeaters for long distance circuits.

While necessarily of a temporary type of construction, these wire systems with their exchange centers, compare in magnitude and complexity with those of our large industrial centers.

Probably the most important development and one which will have the most far reaching effect upon the art in the future, relates to the development and application of thermo-ionic devices. The design and manufacture of these devices commonly known as vacuum tubes, has been placed upon a basis, which probably could not have been reached within a decade under normal peace time conditions.

Some of the more important applications comprise the following:

Radio telephone for communication to and between airplanes while in flight.

Determination of direction by radio compass.

Signaling through the ground by means of leakage currents.

Overhearing of enemy operation through the use of energy amplifying devices.

As a result of the intensive development of the past two years there has been made available to the engineer, a device which will in the future undoubtedly play an important role not only in the communication but in other branches of the engineering world.

### RADIO SIGNALING

*John Stone Stone*

Radio engineering has continued to feel the powerful stimulus of the World War.

Secrecy has necessarily veiled a considerable amount of the original discoveries and inventions made in this field as well as the complete statistics which would disclose the enormous expansion of the manufacturing industry in this line during the past year, because all the development and manufacture were necessarily conducted for the military and naval services and under strict governmental observation and regulation.

The general tendency has been towards a more systematic and sound engineering development of radio communications. Sustained-wave-train radio telegraphy has, to a great extent, replaced the older and less satisfactory damped-wave-train, or spark system, while radio telephony has been developed into a most practical form for airplane service as well as for land and ship stations.

These advances have largely been the fruit of careful quantitative studies of the audion, resulting in the possibility of accurately predetermining its design when it is to be used either as an oscillating generator, detector, amplifier or modulator.

Advances have been made in minimizing "interference" and the amount of radiated power which can be effectively "modulated" by the voice has been increased with a considerable resulting increase in the range of radio telephony.

DONALD MCNICOL, *Chairman.*

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# Electro-Physics for the Telegraph, Telephone and Radio Student

No. 10.

FLOW OF CURRENT IN A WIRE.

The molecule, the atom, and the electron, to the lay mind are mysterious things, but for present purposes it is helpful to remember that an atom contains electrons, and that a molecule contains atoms.

In the ninth installment of this series of articles, which appeared in the July 16 issue, it was explained how the electron theory accounts for the magnetic properties of bodies, and it may be well here to state briefly how this theory of electric action accounts for the transfer of electric energy through a metal conductor.

When the two terminals of a source of electricity are connected by a wire having in circuit a break key, or ordinary Morse telegraph key, there is to be considered the conditions obtaining before the key is closed, and the conditions obtaining after the key is closed. First, it is necessary to realize that the wire itself is composed of molecules, and consequently of atoms. Also, as was explained in the article describing the action of the electric condenser, the atoms of the metal contain electrons.

Those who have studied the older text books will remember that the current in a circuit connected to a direct current source was stated as flowing from the positive terminal of the source, through the circuit and back to the negative terminal of the source. Also there was the later information that the energy flowed, not in the wire, but in the field immediately surrounding the wire. And, there is nothing in present theories of electrical action which conflicts seriously with those statements. Such phenomena as the Cathode Ray, negative discharge, etc., which show that electrons travel from the negative terminal of the source of current, add to, rather than detract from information previously available.

That "something" actually travels through, or progresses from point to point in a given direction in a solid wire conductor when the wire is used as part of an electric circuit, was beyond all understanding so long as it was understood that the molecule or the atom was the thing that would have to travel. It was, of course, inconceivable that an atom of the iron or the copper of the wire could move through the mass of the metal.

The fact is that the tiny germ of physical force, the electron, is something of a traveler, or visitor, among the atoms and molecules of all metals and most liquids. It can pass through the atoms of the metals, and electrons are in effect the electric charges which progress from point to point along a wire circuit; the electrons using the atoms and molecules as stepping stones as they rush with lightning speed along the wire path in an effort to establish equilibrium.

The molecules of the material through which the electrons pass, whether it be metal, earth or water, are not actually displaced; it is their atomic structure that is in a state of activity. The higher the voltage used, or the larger the current flowing, the greater will be the atomic agitation. In a wire circuit we have a direct indication of the atomic agitation which is taking place while the circuit is closed, in the amount of heat produced in the wire. An incandescent lamp filament, although noiseless so far as our ears can advise us, is plainly the seat of a most intense agitation of the atoms of the material of the filament.

*(To be continued.)*


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# QUESTIONS AND ANSWERS

### Snapper Sounders.

H. I. G.—Snapper sounders small enough to carry in the vest pocket may be purchased from TELEGRAPH AND TELEPHONE AGE at forty cents each.

### Telephone Line Transposition.

M. A. C.—The practice of transposing telephone wires for the purpose of minimizing the effects of cross-talk between parallel wires was first introduced in this country in 1886 by James A. Barrett, who at that time was employed in the engineering department of the Bell Telephone Company. A year or two previously transposition of wires with the same object in view was practised in England. Transposed wires were not extensively employed in the United States until beginning about 1890; in fact, in 1891 there were many important long distance lines which had not up to that time been transposed.

### Radio Apparatus.

G. L. D.—We probably could save you some money in the purchase of amateur radio apparatus, and if you will write us stating how complete you wish to make your station we will forward you a list of instruments and cost of same. Receiving stations for amateur working may be set up for from $15.00 upward. Many of our readers are now gradually acquiring high grade apparatus with which to equip first class amateur radio stations. When the ban is lifted on sending by amateurs no one need be lonesome while at home nights.

### Navy and Continental Codes.

A. R. P.—The old alphabet known as the Navy Code is no longer in use. All departments of the United States Signal Corps, as well as Navy operators now use the Continental Morse alphabet. The Continental alphabet is used in all radio operation, both commercial and government, and in the operation of submarine cables.

### Future of Land Line Telegraphers.

M. M. F.—I would not take much stock in statements, no matter from what source they may come, that it is no longer worth while learning the work of a telegraph wire chief. There are today more telegraph wire chiefs, repeatermen, and electrical attendants in Morse wire service in this country than have been in the service at any time in the past. The telephone, printers, and wireless all are gaining ground, but the extension of these services does not to a noticeable extent seem to cut down the demand for expert Morse men. Any telegrapher who takes up the study of the electrical side of the business, and becomes thoroughly familiar with telegraph circuits and apparatus will have open to him steady and lucrative employment, and this will hold true for many years to come.

### Loading Coil for Radio.

G. R. H.—A loading coil of two thousand meters wave length should be twelve inches long, two inches in diameter and wound full of No. 22 enameled or cotton covered wire.

### Leased Wire Operators.

H. H. E.—The International Association of Leased Wire Operators was formed in June, 1916, with headquarters at No. 52 New Street, New York.

### The Johnson Coil.

A. R. D.—The "Johnson" coil is used to reduce sparking at pole-changer contact points in duplex and quadruplex Morse sets, and in printing telegraph sets. The device consists of three distinct or separate windings of insulated wire on a wood bobbin. The windings are insulated from each other and each winding is dead-ended. The other ends of the windings are connected respectively to armature, and open and closed contact points of the pole-changer. The arrangement accomplishes the same purpose as the condenser circuit sometimes provided in multiplex circuit wiring.

### Origin of "OS."

F. L. C.—The symbol "OS" was first used in the year 1855 on the Buffalo and Erie Railroad, being introduced by Superintendent I. A. Bush. At first the signal was used as a general call for "all stations." Shortly after the signal became established Mr. Bush also introduced the system of numbering trains, instead of identifying a train as the "Lightning Express," the "Cincinnati Express," etc., and the symbol "OS" was then extended to mean "train report." It may be that the reason the signal for "all stations" was not adopted as "AS" was that there may have been a station call on the line already designated as "AS," or "SA," so that "OS" was a natural second choice.

### Turkish Telegraphs.

V. A. H.—The Minister of Posts and Telegraphs in office in Turkey during the late war was Hachim Bey.

### Telephone Ringing.

G. H. M.—For the production of alternating and pulsating ringing currents from direct current sources the Bell Telephone companies use an inter-

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rupter known as type 84-E. The direct current source may be eighty cells of dry battery, producing about 100 volts. By means of the interrupter the derived alternating current is of about eighty volts, and the pulsating current about sixty volts. The mechanism of the interrupter consists of an electromagnet vibrating an armature on the same principle as that of an ordinary buzzer. The armature carries contact points which vibrate between sets of contact springs and brings them successively into the circuit.

## SHOP TALK.

### Managing Circuits.

BY THE OBSERVER.

Sometimes it happens that there is but one available wire between two terminal offices on a direct route, and when this wire is either duplexed or quadruplexed, there will arise occasions when the main battery at either end will be interrupted (power off). When this happens the office whose power is off should immediately single the circuit and advise the distant office of the nature of the trouble. So long as it is not the wire that is in trouble the circuit may to advantage be worked single until power for multiplexing is restored.

Where there is an office with sufficient business to justify multiplex apparatus (the term "multiplex" was long ago given to duplex and quadruplex working) that office generally has more than one outlet; either part of the way along the same route as that of the interrupted circuit or along other routes.

Aside from how the message traffic is to be moved, it is always to be understood that the wire chief must locate the trouble on a circuit as soon as possible after it develops. Sometimes the process requires considerable time, and while the attempt is being made to find the bad spot the traffic supervisor should be kept informed as to the probable time of restoration of the defective circuit, so that he may form plans for handling the business promptly.

It requires but a few seconds to single a circuit, whether it is operated by printer or other multiplex methods, and in view of the fact that much annoyance may be saved by so doing, newly appointed wire chiefs should be posted as to the importance of so acting. When the power is interrupted, notifying the power house, or whoever is in charge of the source of power, is immediately necessary, but this can be done by an assistant; it is important also that the distant terminal office be notified of the trouble and its probable duration.

FUSES.

Another source of delay and annoyance occasionally observed is the inability quickly to locate spare fuses of the correct capacity, when fuses in circuit are blown. This is an inexcusable situation. The telegraph company supplies spare fuses in any quantity required, and stocks should not be allowed to become depleted. All attendants likely to be in charge at any time should know the kind of fuse to place in any circuit and should know where to procure spare fuses without having to search for them.

These Shop Talk articles are about the little and big things that come up daily in the work of wire chiefs and repeater attendants. The things talked about are close to the day's work. We can make ourselves happier and the company satisfied with our performances if we co-operate in the interests of good telegraph service. You help the other fellow when you have an opportunity and he will return the favor. Don't wait for him to do it first.

A good motto is, "Let us try and be the fellow we would like to be." All can aim at that target, even if all do not hit it. With that good thought in mind, however, we shall be further along the road to success and happiness.

*(To be continued.)*

### United States Civil Service Examination—Telephone Plant Engineer.

The United States Civil Service Commission announces an open competitive examination for telephone plant engineer, for men only. Vacancies in the Signal Service at Large of the War Department, and in positions requiring similar qualifications, at $1,800 to $2,400 a year, will be filled from this examination.

Certification to fill the higher-salaried positions will be made from those who attain the highest average percentages in the examination.

At present there are vacancies at Chicago, Ill., and San Francisco, Calif.

Competitors will not be required to report for examination at any place, but will be rated on the following subjects, which will have the relative weights indicated, on a scale of 100: (1) Physical ability, 10; (2) Education and experience, 90.

Competitors will be rated upon the sworn statements in their applications and upon corroborative evidence.

Applicants should at once apply for Form 1312, stating the title of the examination desired, to the Civil Service Commission, Washington, D. C., the Secretary of the United States Civil Service Board, Customhouse, Boston, Mass., New York, N. Y., New Orleans, La., Honolulu, Hawaii; Post Office, Philadelphia, Pa., Atlanta, Ga., Cincinnati, Ohio, Chicago, Ill., St. Paul, Minn., Seattle, Wash., San Francisco, Cal.; Old Customhouse, St. Louis, Mo.; Admininstration Building, Balboa Heights, Canal Zone; or the Chairman of the Porto Rican Civil Service Commission, San Juan, P. R.

Applications should be properly executed, excluding the medical and county officer's certifications, and must be filed with the Civil Service Commission, Washington, D. C., prior to the hour of closing business on August 26, 1919.

Buying War Savings Stamps is the beginning of wealth.

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# Telegraph Systems in the United States

According to a report just issued by Director Sam. L. Rogers, of the Bureau of the Census, Department of Commerce, the 21 commercial land telegraph systems in the United States in 1917 operated 241,012 miles of pole line, comprising 1,888,793 miles of wire; sent 151,725, 288 messages; and employed 47,227 persons, to whom were paid salaries and wages amounting to $36,392,140. This report, which is issued under the title "Telegraphs and Municipal Electric Fire-Alarm and Police-Patrol Signaling Systems," was prepared under the supervision of Mr. Eugene F. Hartley, chief statistician for manufactures, and is the fourth of a series of quinquennial reports on the telegraph systems of the country.

The pole-line mileage in 1917 was less by 2.6 per cent than in 1912, but was greater by six-tenths of one per cent than in 1907. The wire mileage, however, showed an increase of 4.1 per cent as compared with 1912 and 19.7 per cent over 1907. The increase in the number of messages was much greater—45.7 per cent during the last five years' period and 53.1 per cent during the ten years from 1907 to 1917. The number of employees increased by 39.2 per cent between 1912 and 1917 and by 84.9 per cent during the period 1907-17, and the corresponding percentages of increase in their salaries and wages were 59.2 and 124.2.

The number of telegraph offices in 1917 was 28,865, a decrease of 6.2 per cent as compared with 1912 and of seven-tenths of 1 per cent as compared with 1907. The total income from telegraph traffic was $91,312,567, an increase of 74.5 per cent over 1912 and of 140.8 per cent as compared with 1907; the income from all other sources was $1,641,803; the total expenses, including charges for depreciation and sinking funds, were $80,828,970, an increase of 52.9 per cent over 1912 and of 111.4 per cent over 1907; and the net income was $12,125,400, an increase of 253.4 per cent as compared with 1912 and 113.7 per cent over 1907. The par value of the outstanding capital stock of the companies was $106,360,237, a decrease of 1.7 per cent as compared with 1912 but an increase of 4 per cent over 1907.

The foregoing figures relate only to commercial telegraph companies, and thus exclude the wire and pole line wholly owned and operated by railroads, and also exclude the equipment and telegraph business of the various press associations which lease and operate wires for dispensing news.

The Postal Telegraph-Cable Company transacts some telephone business in addition to its telegraph business. Its development of long-distance telephone service has been particularly rapid in the South and Southwest.

### THE PRINTING TELEGRAPH.

During the five-year period, 1912-1917, the printing telegraph came into extended use by telegraph companies, press associations, and railroads. The printing telegraph consists essentially of a sending instrument, equipped with a keyboard similar to that of a typewriter, electrically connected with a receiving instrument in such a manner that the latter automatically reproduces what is typewritten on the sending instrument. Without the printing telegraph it would have been difficut or impossible to handle the increased telegraph business during the Great War.

### TRAIN DISPATCHING BY TELEPHONE.

A special feature of the report, relating to train dispatching, is of some interest. The first installation of telephone and selector equipment for train dispatching was completed on the lines of the New York Central Railroad in October, 1907. The use of the telephone for this purpose has increased rapidly. The report shows, for 1917, 105 lines employing this method of train dispatching, as against 42 in 1912. The mileage of telephone pole line for train-dispatching purposes was 95,268, an increase of 67.6 per cent as compared with 1912; and the mileage of wire was 201,662, an increase of 55.7 per cent over 1912. The total line mileage of railroads reporting the use of telephones for transmitting train orders in 1917 amounted to 110,404. It is a asserted that not a single accident has resulted from the use of telephones in train dispatching.

### WIRELESS TELEGRAPH SYSTEMS

All the wireless telegraph systems in the United States were taken over by the federal government under authority of an executive order issued April 6, 1917, for which reason the figures for 1917 give little indication of the increase in commercial wireless telegraph operations during recent years. The systems reported for 1917 numbered 3, as compared with 4 in 1912 and 5 in 1907; and the number of tower stations was 63, as compared with 74 in 1912 and 117 in 1907. The number of messages handled prior to April 6 was 122,244. No exact record of the number transmitted during the period of government operation is available, but it is roughly estimated that 330,000 messages were handled between April 6 and December 31, 1917. This number, added to that already given, would make a total of more than 450,000, representing an increase of approximately 58 per cent as compared with 1912 and of 191 per cent over 1907.

The total income and the net income increased greatly. The former aggregated $1,385,060 in

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1917, representing a gain of 107 per cent over 1912 and of 1,197 per cent over 1907; and the latter amounted to $609,526, as compared with a net income of $4,738 in 1912 and a net deficit of $53,538 in 1907. The employees numbered 586, a decrease of 38.8 per cent from the corresponding number in 1912 but an increase of 233 per cent over the number for 1907; and their salaries and wages aggregated $461,402, an increase of 17.2 per cent over 1912 and of 464.3 per cent over 1907.

In addition to the commercial shore stations, there were in operation during the early part of the year 6,089 general and restricted amateur stations, 88 special amateur stations, 75 experimental stations, and 47 training schools.

The records of the Bureau of Navigation, of the Navy Department, show that on June 30, 1918, there were in operation 134 commercial shore stations and 838 commercial ship stations. Of the shore stations, 97 were in continental United States, 28 in Alaska, 8 in Hawaii, and 1 in Porto Rico.

GOVERNMENT WIRELESS.

The government has erected wireless plants at various points along the Atlantic and Pacific coasts and at Pearl Harbor, Hawaii, and Cavite in the Philippines. The government shore stations, according to the reports of the Bureau of Navigation, numbered 135 on June 30, 1918, of which 88 were in continental United States, 20 in Alaska, 19 in the Philippine Islands, 3 in the Canal Zone, 2 in Hawaii, and 1 each in Porto Rico, Guam, and Samoa. The government ship stations totaled 470.

The station at Arlington, Va., has been in regular communication with the station at Chollas Heights, near San Diego, Cal., since May 1, 1917. Direct communication with an Italian government station in Rome was also established. On September 29, 1917, radio communication was established between Arlington and Pearl Harbor, H. I., via Sayville, N. Y. Messages are now transmitted between Arlington and the Philippines, through San Diego, Cal., and Pearl Harbor, H. I. Under favorable conditions, at night, the Arlington station can communicate directly with the Pearl Harbor station, but the usual practice is to relay through San Diego.

# INDUSTRIAL

## C. G. DuBois Now President of the Western Electric Company.

At a meeting of the Board of Directors of the Western Electric Company held on July 1, 1919, Charles G. Du Bois was elected president to succeed H. B. Thayer, who has resigned after 38 years of service to assume the presidency of the American Telephone and Telegraph Company. Mr. Thayer was elected chairman of the board.

Mr. Du Bois was born in 1870. After his graduation from Dartmouth College in 1891, he joined the Western Electric Company in New York, as a clerk in the accounting department, and in 1896 he was appointed chief clerk at the New York office. In 1898 he was elected secretary of the company with offices at Chicago. This work carried with it a general supervision of the entire accounting system of the Western Electric Company, and in this connection Mr. Du Bois was largely instrumental in working out and securing the adoption of the company's first pension plan.

Shortly after assuming the duties of secretary, Mr. Du Bois was also made supervisor of branch houses. This carried with it the opening of a large number of distributing houses, which are now a part of the company's organization.

In 1907 Mr. Du Bois was transferred from the Western Electric Company to the American Telephone and Telegraph Company as its comptroller. In this capacity he inaugurated and supervised a new comprehensive system of accounting for the Bell Telephone System. In 1917, shortly after the entry of the United States into the war, he went to Washington to serve as comptroller for the American Red Cross. After systematizing the Red Cross accounting work and organizing a department to carry it on, he resumed his duties with the company.

On October 1, 1918, Mr. Du Bois re-joined the Western Electric Company as vice-president, which office he held until his accession to the presidency. Mr. Du Bois' long association with Mr. Thayer in the administration of the company insures a continuity of policy and methods in the conduct of the business.

C. D. McCLARY, who has been with the Western Electric Company since February, 1910, has been made Sales Manager of the Pittsburgh office, effective July 1, 1919. Mr. McClary was first connected with the Philadelphia office and transferred to Pittsburgh the latter part of 1910. In April, 1916, he joined the sales force, and in April, 1918, was promoted to Assistant Sales Manager. He has held that position until his present promotion.

## The French Flasher.

The above is the title of a new house organ published by the French Battery and Carbon Company, of Madison, Wis. The first number is full of ably written material of interest to the French company's employees. This company has been particularly successful in building up a strong cooperative spirit among its many employees; its field forces as well as those at the home office and manufacturing plant.

LESAGE, of Geneva, Switzerland, employing a frictional machine source of electricity, twenty-four conducting wires and pith-ball electroscopes, in the year 1774, transmitted telegraph signals over a short distance.

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### Cable Codes.

TELEGRAPH AND TELEPHONE AGE is headquarters for all cable cipher codes. Telegraph managers would do well to bear this fact in mind when customers make inquiries regarding such codes. We are prepared to furnish full information on the subject, our knowledge being based on over thirty-five years' experience in handling the hundreds of codes on the market. Address TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

### Submarine Cable Working.

"Beginner's Manual of Submarine Cable Testing and Working," by G. M. Baines, is a book of 265 pages dealing in a thorough manner with the operation of submarine telegraphs.

The first four chapters contain elementary matter relating to batteries, electrical laws, etc. Chapter V. covers copper resistance of cable, instrumental zero, false zero, theory of false zero test; and in the following eighteen chapters up to date matter is incorporated explaining cable insulation tests, inductive capacity of cables, tests for broken cables, curb transmitter, mouse mill device, recorder adjustment and other matter which should form a part of every cable man's technical knowledge.

The price of the book is $4.50, and copies may be obtained from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

### New Western Union Telegraphic Code, Five-Letter Edition.

The New Western Union Telegraphic Code, Five-Letter Edition, has recently been placed on the market and the large sales of the book testify to its rapidly growing popularity. The business man needs this work, and when he sees it he instantly adopts it. The book contains 380,000 phrases, each phrase being represented by a five-letter word. These words are pronounceable singly or when two of them are joined together. The latter results in the saving of fifty per cent in cable tolls. The book weighs fifteen pounds, contains about 2,000 pages and measures thirteen inches in length by eleven inches wide, and is three and one-half inches thick. There is no waste space in the book. Every telegraph manager should call this book to the attention of his customers. The price is $30.00 per copy and it is on sale at the office of TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

### Single Line Repeater.

The single line telegraph repeater manufactured by the Jester-Cooper Company, Houston, Tex., is being used successfully on several large railroad systems and in commercial telegraph service.

The management of this repeater is as simple as that of an ordinary single relay and sounder set, with which all telegraph operators are familiar. No local battery is required in its operation.

### Death of Louis K. Whitcomb.

Louis K. Whitcomb, aged 67 years, one of the most prominent figures in telegraph circles for the past forty years, died on July 18 at Monrovia, Calif., where he had been living since his retirement from active service about three years ago. He was a native of Illinois and passed through the various grades of the telegraph service to the position of chief operator of the main office in Chicago, which position he held for many years. In 1910 he was appointed superintendent at Dallas, Tex., and a few years later retired from telegraph activities.

THE TELEGRAPH AND TELEPHONE LIFE INSURANCE ASSOCIATION has levied Assessment No. 660, to meet the claims arising from the deaths of: David Keeler, Fort Worth, Tex., Wm. J. Lawler, Cincinnati, Ohio; Chas. D. Case, Batavia, N. Y.; Geo. H. Merrill, Somerville, Mass.; W. G. Shockley, Crissfield, Md.; and A. B. Peters, Woodhaven, N. Y.

CALVIN C. STANLEY, employed by the Western Union Telegraph Company at Syracuse, N. Y., since November 28, 1870, died at his home, July 5. Mr. Stanley was born July 5, 1855, and had been Late Night Wire Chief since 1884. Mr. Stanley was well and favorably known in telegraph circles throughout central and western New York.

ERASTUS A. BARNARD, a member of the telegraph profession at Washington, D. C., died in that city on July 3.

### Chile Telephone Company.

For the year ended March, 1919, the company's operations showed a profit of $368,675.00. After deducting income tax and excess profits tax, and placing $76,338.00 to general reserve and $67,500.00 to reserve for renewal of plant, the directors recommended a dividend of three shillings (British) per share, free of tax; leaving $38,295.00 balance in hand.

### Submarine Cable Testing.

We have received a supply of "Darby and Fisher's Students' Guide to Submarine Cable Testing," fifth edition, one of the most popular books on this important subject.

The book contains 240 pages and deals with all tests and measurements made in modern submarine cable practice. An appendix is included which contains answers to all questions presented in the main work.

The price of the book is $4.50 and copies may be had from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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# Telegraph and Telephone Age

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## The Secretary of the Navy Is Right.

At least, Mr. Daniels is right when he says: "The ability to transact business depends upon communication, and unless the systems of communication are effective the transaction of business is made difficult in direct proportion to the facility with which the communications are handled." But, when he says: "I am convinced the Navy Department can assist materially in preventing what promises (under present laws) to be an intolerable situation in the business world by using the communication facilities of the department (Navy Department) which are now available, and which, logically, should be so used," he makes a statement which, he will undoubtedly discover, he may shout from the housetops from now until the end of time without gaining converts to his view.

The statements quoted were contained in a letter Mr. Daniels forwarded to Speaker Gillett of the House of Representatives accompanying a bill which seeks the commercialization of the naval radio facilities of the Government. At present, under war legislation, the naval radio stations are permitted to handle commercial messages in competition with the privately owned submarine cable systems, and the purpose of the bill is to extend this practice after the formal declaration of peace.

When the Secretary of the Navy speaks of "Affording the commercial interests of the country relief from the delays already experienced in their communications with foreign commercial firms" he gives one more proof of what is in the minds of the present Administration, and of what is the matter with the country.

It does not seem to have entered Mr. Daniels' mind, any more than it did Mr. Burleson's, to first obtain the opinions of commercial interests before deciding for them how their business should be handled.

Apparently, bales of resolutions from the Merchants Association of New York and of other cities, pointing out thousands of instances of inefficiency in Government managed facilities, has had no weight in establishing opinion at Washington. The Secretary of the Navy, as did the Postmaster General, makes momentous decisions in the interests of the business community regardless of the thunderings of the commercial world for a voice in the matter.

It is true that today America is supreme in the radio field, and that supremacy is the result of private, individual effort. Throttle radio invention and development by turning the art over to a Government department and radio supremacy will not long remain on these shores.

So far as are concerned those who will have to work the keys and wear the head-receivers, they may be able to get some first-hand information from any postoffice employee they may know as to the prospects for a brilliant career in a government department.

Moreover, at a time when the leaders of certain elements of the population are courting a wreck of industry by calling for Government ownership of enterprises now in difficulties, it is particularly advisable that the Government should return to its owners a business that is unlikely to experience difficulties of this nature.

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# CURRENT EVENTS

## EXECUTIVE OFFICE ANNOUNCEMENTS, PERSONAL MENTION, APPOINTMENTS

### PERSONAL.

W. G. MORSE of San Diego, Cal., a son of Professor S. F. B. Morse, the inventor of the telegraph, was a New York visitor recently. Before returning to California, he visited his brother, Edward Lind Morse, at his home in Pittsfield, Mass.

BRIGADIER GENERAL EDGAR RUSSEL, the head of the United States Signal Corps of the American Expeditionary Forces in France during the late war, has returned home. General Russel received many decorations for the great part he played in the war, and is one of the few general officers who went to France with General Pershing, who remained in command until the Germans were walled in beyond the Rhine.

E. F. HOWELL, secretary of the Serial Building Loan and Savings Institute, 195 Broadway, New York, is spending a month's vacation at Niantic, Conn.

EDWARD FAGAN is manager of the Western Union division of the New York *Times* telegraph department.

G. F. BARLOW and J. C. BRYANT, of the printer department, Great North Western Telegraph Company, Toronto, Ont., are in New York for a week on their annual vacations.

WILLIAM M. GIBSON, the winner of no end of gold medals for fast Morse sending at telegraph tournaments, is now and has been for many years, in the brokerage business in Wall Street, New York.

### Lieut. Col. Hallahan Cited.

Lieut. Col. William L. Hallahan, formerly chief signal officer of the Twenty-seventh Division, now located at 100 Broadway, New York, has been notified that General Pershing named him in a citation. The commendation reads:

"For gallantry in action east of St. Souplet, France, Oct. 17, 1918, and for brilliant leadership he is entitled to wear a silver star on the Victory medal."

Lieut. Col. Hallahan was decorated with the British D. S. O. by Field Marshal Haig last fall after action with the British forces near St. Quentin.

### WESTERN UNION TELEGRAPH COMPANY.

W. N. FASHBAUGH, vice-president, has started for Colorado, where he will spend his annual vacation.

W. J. BLENHEIM, traffic manager, Western Union cable system, has returned from a trip made to Nova Scotia and Newfoundland cable stations.

IN THE FOLLOWING CITIES the company has created the position of city superintendent: Boston, Buffalo, Pittsburg, Atlanta, Louisville, Memphis, Norfolk, Des Moines, Kansas City, Minneapolis, Omaha, St. Louis, St. Paul, Cincinnati, Cleveland, Columbus, Detroit, Indianapolis, Denver, Salt Lake City, Milwaukee, and Toledo; the superintendents reporting direct to division general managers. In most cases the present manager has been advanced to fill the new position; the main office in each city being placed in charge of an office manager.

AURORA BOREALIS electrical disturbances of an unusually severe nature interfered with the operation of telegraph lines on August 11. The disturbances were felt throughout the entire country; not only throughout the North and West, as is generally the case, but on circuits running north and south along the Atlantic seaboard. Induced currents of a strength above one-tenth ampere were observed in some circuits.

### Western Union Salaries.

In the July 16 issue of TELEGRAPH AND TELEPHONE AGE was published information explaining the application of the back pay allowances made retroactive to August 1, 1918.

Upon surrender by the Government of the lines to the company, August 1, 1919, the time-and-a-half basis for computing Sunday overtime was re-established. Also, it may be noted that the system of premium or bonus circuits has become a thing of the past.

The subject of regular compensation for operating department employees is at the present time being thoroughly gone into in conference between the executive offices and representatives of the Association of Western Union Employees.

JAMES B. DILLON, of the Testing and Regulating Department, Denver, Colo., is spending his vacation high up in the mountains where they have snow-shoeing in July.

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W. E. PEIRCE of the Washington office, has returned to the Capitol after a two months' visit to Idaho and Pacific Coast States. He is very much improved in health.

O. A. CARROLL, formerly manager at Iowa City, Iowa, has been advanced to the management of the North Platte, Neb., office, where he is also repeater attendant, that city being a high speed repeater station.

## New York Western Union.

25 WALKER STREET.

As a means of using the surplus money that was made at the entertainment and ball held by the bookkeeping department employees in the central Opera House on April 4, on Friday, July 18, two sight-seeing buses were engaged to take as many of the employees who wished to go on an automobile ride to Rye Beach, New York. About seventy attended.

Dinner was served at the Beach Hill Inn, where dancing was enjoyed by all.

## Brooklyn, N. Y., Western Union.

The regular monthly meeting of the Association of Western Union Employees was held on July 2, for the purpose of electing officers for the ensuing year.

J. P. Donovan, was re-elected president and Miss L. O'Grady, secretary-treasurer.

Election Committee, comprising David Maines, Miss M. Gregory, and Miss M. Buckley, elected J. P. Donovan with a total of 36 votes. Mr. W. H. Sembler received 23 votes, the next highest number, and was declared the alternate.

Mr. Donovan requested to be excused from serving, and Mr. Sembler was declared the Elector.

Mr. J. H. Driscoll, W. H. Sembler, and L. R. Pitkin were elected as the Local Committee. Mr. C. A. Harvey, Miss Anna B. Lyons, and B. S. Schatzman were declared the alternates.

## Boston Western Union Notes.

At the recent election of Boston Traffic Local No. 37, Association of Western Union Employees, the following were elected to serve one year: President, John F. Fahey; Secretary-treasurer, J. P. Hennessey; Grievance Committee, R. W. Dodd, (Morse) L. W. Peterson, (Multiplex) J. F. Stevens, (Testing and Regulating).

James F. Madigan, the retiring president, and L. E. Verry, the retiring Secretary-treasurer, are receiving high praise for the great work they performed in the up-building of this local, which is numerically and financially in a flourishing condition. "Jim" was selected as delegate from the New England district of the Eastern Division to the national A. W. U. E. convention to be held at Denver, Colo.

The summer rush is on, traffic over the summer resort wires showing a big increase over last month. In this connection, Joseph Ellems of the testing and regulating department, made a trip to Concord, N. H., recently and looked over the repeaters installed on the heavily loaded mountain wires passing through there.

James P. Colson, for 43 years all-night chief of the Boston office, made us a visit a few days ago. "Jim", who is on the retired list, is looking younger and spryer than ever.

Harry L. Palmer, recently discharged from the 26th Division, A. E. F., who returned from France after participating in fifteen battles and going "over the top" three times, has been assigned to the C. N. D. where he is running the Chicago grain keyboard. Others who have returned to work from "over there" include Harry Stanton and M. H. King, each of whom participated in no less than twelve battles.

John B. Rex, chief operator, made a brief visit to Philadelphia and spent a pleasant week-end with relatives recently.

George H. Batho has been transferred to the C. N. D. Morse force where he is working the grain wire, vice W. J. Brown promoted to first stocks.

## New Western Union Office at Kansas City, Mo.

The new four story building at the corner of Seventh and Walnut Streets, Kansas City, which is to be used by the Western Union Telegraph Company as its main office in that city, is now ready for the installation of telegraph equipment. Installers are now at work under the direction of the division plant superintendent's department.

The area of each floor is 10,000 sq. ft. The basement contains 5,000 sq. ft. All of the 45,000 sq. ft. of space is to be used by the telegraph company.

The operating and service departments are to be located on the fourth floor. The testing and regulating department, bookkeeping department, the district commercial superintendent's office and the multiplex schools, are to be on the third floor. The second floor will be devoted to the telephone department lockers, rest and toilet rooms for all forces. The rest rooms will be spacious and comfortably furnished. The restaurant is also to be on the second floor. Complete kitchen equipment is to be provided so that a complete menu may be served. The counters are arranged for self service.

On the ground floor will be located the main commercial office, messengers' quarters and club rooms, tailor shop for maintenance of messengers' uniforms. The city commercial manager will meet the public in commodious quarters on this floor. The remainder of the first floor will be used by the district plant department.

The pneumatic tube compressors, emergency electric power unit, heating boilers and drinking water refrigerating apparatus, are to be in the basement. Steel shelving for the orderly accommodation of supplies will be placed in the remainder of the basement space.

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## POSTAL TELEGRAPH-CABLE COMPANY.

### IMPORTANT OFFICIAL CHANGES IN THE STAFF ORGANIZATION OF THE POSTAL TELEGRAPH-CABLE COMPANY.

In the staff organization of the Postal Telegraph-Cable Company several changes have been made, effective from August 1.

Vice-President and General Manager Edward Reynolds in announcing these changes calls attention to the fact that all promotions are made from within the company's ranks. This policy which has long been practiced encourages the younger members of the organization to work for the higher positions—that is, those with greater responsibilities and larger salaries.

John J. Whalen has been appointed traffic manager, and attached to the general manager's department. Mr. Whalen for many years has been manager of the New York main operating department.

Curtis A. Comstock, superintendent first district, Western Division, Chicago, Ill., has been transferred to New York as assistant to the general manager.

William C. Daviet, superintendent, first district, Southern Division, Richmond, Va., has been transferred to New York as assistant to the general manager.

Eugene P. Tully, manager, New York City offices, transferred to the general manager's department, New York.

Jed G. Blake, special agent, Chicago, Ill., appointed sperintendent, first district, Western Division, Chicago, succeeding C. A. Comstock.

Harry C. Shaw, division electrical engineer, Pacific Division, San Francisco, Cal., appointed superintendent, first district, Pacific Division, succeeding William Hearn, retired.

H. E. Patton, manager; Cleveland, Ohio, appointed superintendent, second district, Pacific Division, Seattle, Wash., vice J. A. Forehand, retired.

Walter W. Morrison, manager, St. Louis, Mo., appointed superintendent, third district, Pacific Division, Los Angeles, Cal., succeeding Vail V. Stevenson, resigned.

K. F. Stiles, manager, Houston, Tex., appointed superintendent, first district, Southern Division, Richmond, Va., vice W. C. Daviet.

Gordon Sprong, manager Toledo, Ohio, appointed manager Cleveland, Ohio, vice H. E. Patton.

J. F. Horn, manager, Canton, Ohio, appointed manager Toledo, Ohio, vice Gordon Sprong.

Victor E. Blume, assistant manager, St. Louis, Mo., appointed manager, St. Louis, vice W. W. Morrison.

James J. McDermott, manager main office receiving and delivery department, New York, appointed mangaer of New York City offices, vice E. P. Tully.

Lemuel R. Thomas, chief clerk to the general superintendent, Western Division, Chicago, appointed assistant superintendent, sixth district, Western Division, Chicago.

A. L. Balassa, complaint and claim clerk, Western Division, appointed chief clerk to the general superintendent, Western Division, Chicago.

Thomas P. Dowd, manager, Bridgeport, Conn., appointed manager at Washington, D. C., vice G. M. Foote, retired.

Charles P. Bruch, third vice-president, New York, resigned effective August 1.

MANAGERS APPOINTED.

M. W. Hicks, Rock Springs, Wyo.; D. N. Manning, Orangeburg, S. C.; A. R. Bird, Dade City. Fla.; H. H. Julian, Texarkana,. Ark.; E. Girard, Ashland, Ky., and D. H. Farmer, Toccoa, Ga.

MINOR M. DAVIS, electrical engineer, is away on his annual vacation, boating and fishing at Chatham, Mass.

MISS GRACE ADAMS, daughter of C. C. Adams, second vice-president of this company, who has been a member of a scientific exploration party operating in the neighborhood of Santa Fe, N. M., during the past few months, has gone to Cheyenne, Wyo., where she will spend the remainder of the summer on a ranch in that neighborhood.

DAVID H. GAGE, jr., assistant engineer, Eastern Division, has returned from his vacation which he spent in the mountains on the upper Hudson.

E. M. UNDERHILL, chief clerk to Vice-President C. C. Adams, has returned from his vacation which he spent in the neighborhood of New York.

M. A. MCCONNELL, who was in military service during the war, has returned to the service and resumed his former position as chief clerk to General Manager Edward Reynolds.

DANIEL F. MALLEN has been appointed manager of the New York main operating room, vice J. J. Whalen, promoted to traffic manager.

T. V. RAHTES, formerly chief operator at Fa office, Forty-second Street and Fifth Avenue, is now employed as assistant chief operator in the New York main operating room.

HARRY G. FUNK, for several years loop chief operator in the New York main office, has been placed in charge of the telegraph department of the New York *Evening Sun*.

EDDIE RAHTES, chief operator in the Cotton Exchange Postal office, has returned from a trip through the South, where he visited most of the large telegraph offices in the cotton States with which the New York Cotton Exchange office does business by direct wires.

R. M. TELSCHOW, assistant chief operator, New York main office and who has to his credit quite a number of literary productions which have appeared in Eastern magazines, has purchased an estate of eight acres near Ridgewood, N. J., known as Edgewood farm.

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R. S. WISHART, at one time chief of the printer department, New York main office, and who joined the army as a Master Signal Electrician early in the war, is reported to have been one of the two first Americans to cross the fortified section known as the Hindenburg Line.

### Additional Telegraph Circuits.

POSTAL TELEGRAPH-CABLE COMPANY NOW ENGAGED IN ERECTING ADDITIONAL LONG DISTANCE CIRCUITS IN VARIOUS PARTS OF THE COUNTRY.

To meet the commercial telegraph requirements resulting from a large increase in the volume of telegraph traffic, the Postal Telegraph-Cable Company has purchased about 24,000 miles of new copper wire and is now engaged in stringing additional circuits on many routes.

As was foreseen by the management of the company, the return of the wires from Government to private operation has witnessed an increase in traffic, and as the company's reputation during the past twenty years has been built up on fast service to the public, the desire is to still further improve the facilities to keep pace with increased traffic.

"UNITED EFFORTS" is the name of a bright, ably written local news bulletin distributed among Postal Telegraph-Cable Company employees in the Cleveland, Ohio district. Manager H. E. Patton of the Cleveland office evidently has a live organization, and *United Efforts* serves as a medium for the dissemination of ideas which make cooperation interesting and profitable.

### Explanation Accepted.

Chief Operator Black of the Postal Telegraph-Cable Company's Cleveland, Ohio office had occasion recently to call upon an operator to explain, if he could, a discrepancy between "how it was sent" and "how it was received." The operator prepared what seemed to him a perfectly plausible written explanation and handed the papers to the chief operator. Within a few minutes the papers again were delivered at the operator's desk bearing the following notation from the C. O.: "Your explanation is as clear as mud." Promptly the documents traveled back to the chief with the closing statement from the operator reading, "Well! that covers the ground."

### Dog Days.

A Boston man who sent his family into the country in June, recently received a telegram from a member of the family, reading: "We are suffering from the dog daze now."

After a few attempts to frame an appropriate reply, father filed a message reading: "Everybody in a daze here since July first"

## THE CABLE.

GEORGE GRAY WARD, vice-president and general manager of the Commercial Cable Company, is in London, England, on business of the company. Mr. Ward expects to return to New York in September.

F. B. GERRARD, general superintendent of the Commercial Cable Company, New York, is spending his annual vacation at points in Nova Scotia.

IT IS REPORTED that K. Uchida has started from Tokio, Japan, for the United States to confer with the United States Government and American financial interests relative to the project of laying an additional Pacific submarine cable to extend from San Francisco to Japan by way of Hawaii and Midway.

MR. DENNISON-PENDER, M.P., recently stated in the House of Commons, London, that the Eastern Telegraph Company expects to lay in October, this year, a new cable from a port in England to Gibraltar, later extending it through the Mediterranean to Aden and on to Singapore.

LIEUT. COL. ARCHER-SHEE, in the British Parliament, inquired recently as to what is being done by the Imperial Communications Board to increase the cable facilities of the Empire. He stated that, out of seventeen cables crossing the Atlantic at the time of the war, thirteen were in the hands of American companies, two were German and two were French. One of the German cables was given to the French under the treaty, the other to Great Britain. He remarked further that, had British interests laid an additional trans-Atlantic cable or leased one of the American cables, the additional facilities would have been of great assistance to British mercantile concerns.

### Submarine Cable Testing.

We have received a supply of "Darby and Fisher's Students' Guide to Submarine Cable Testing," fifth edition, one of the most popular books on this important subject.

The book contains 240 pages and deals with all tests and measurements made in modern submarine cable practice. An appendix is included which contains answers to all questions presented in the main work.

The price of the book is $4.50 and copies may be had from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

### Cable Codes.

TELEGRAPH AND TELEPHONE AGE is headquarters for all cable cipher codes. Telegraph managers would do well to bear this fact in mind when customers make inquiries regarding such codes. We are prepared to furnish full information on the subject, our knowledge being based on over thirty-five years' experience in handling the hundreds of codes on the market. Address TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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## RADIO TELEGRAPHY.

### MARCONI NOTES.

ALEX. E. REOCH, of the engineering department, has returned from a six months' stay at Buenos Aires, where he went on business of the company.

ROBERT F. MILLER, chief electrician (radio), has been released from the navy and rejoined the Eastern Division as chief operator.

DAVID SARNOFF, commercial manager, is enjoying his vacation on Cape Cod.

MESSRS. WEAGANT AND WINTERBOTTOM have returned from an inspection of the Chatham, Mass., station.

WALTER E. WOOD, superintendent of the high power station at Chatham, Mass., reports the birth of a son on July 28.

### Independent Wireless Telegraph Company Notes.

P. R. MALLORY, president of the company, is on vacation, cruising on Long Island Sound.

CHARLES J. PANNILL, vice-president of the company, has been in Washington during the past week on business.

F. K. LEATHERBEE, treasurer, has returned from Detroit, Mich., where he has been for some time on company business.

N. E. ALBEE, formerly Radio Aid in the Naval service, has joined the technical staff of this company.

THIS COMPANY'S business continues to grow at a rapid rate. The number of American vessels equipped with radio by the Independent Company is increasing daily.

BIDS WERE OPENED in Washington, D. C., July 15, by the United States Shipping Board for the care, inspection and maintenance of radio service on approximately one thousand vessels. While the Independent Company was the lowest bidder on the sliding scale from 250 to 1,000 vessels, its bid was only a few dollars per ship less than the bids of other companies, indicating a well worked out scale of charges, possible only by long experience in the operation and maintenance of radio service.

IN THE MONTH of July this company placed more than 200 radio operators on ships sailing out of New York.

DR. V. BUSH, research engineer in the service of the American Radio and Research Company, has been appointed associate professor of electrical engineering at the Massachusetts Institute of Technology. Dr. Bush is well known in the radio field, having written several valuable technical papers which have been published in the A. I. E. E. and I. R. E. proceedings during the past few years.

PROFESSOR A. P. LITTLE, formerly of the Bureau of Standards, Washington, and during the war instructor in the Yale University Signal Corps Training School for officer candidates, has been appointed professor of electrical engineering in the Colorado School of Mines.

CHARLES OBEREM, one of the early radio engineers, associated with the Massie Company at Providence, R I., is now in the engineering business at Dillon, Mont.

### British Marconi Award.

On July 25, an award of $2,950,000 damages was made to the Marconi Wireless Telegraph Company, London, for breach of contract brought against the British government; the contract being that for the construction of the series of radio stations commonly known as the Imperial Wireless Chain. The award was in payment for governmental use of the radio stations at Poldhu and Carnarvon.

### New Radio Call Book.

The Consolidated Radio Call Book, which contains 2,500 calls in addition to those listed in the Berne Bureau's call book of April, 1918, is now ready for distribution. The book will be of great value both to the amateur as well as the professional radio operator. In addition to the complete list of radio ship and shore station calls of all nations the book contains a large amount of information relative to radio traffic handling, rates, etc. Copies may be purchased from TELEGRAPH AND TELEPHONE AGE, at $1.00 per copy.

### Wireless Records.

A set of four double wireless records containing eight wireless lessons is now ready for delivery.

Record No. 1 contains the wireless or Continental alphabet, followed by punctuation marks and numerals, each character repeated three times. Records two to eight inclusive are made up of selected words and sentences adapted to make easy the acquirement of wireless telegraphy.

The price of this set of four wireless records, eight lessons in all, is $8.00, or $2.50 for one double record containing two lessons. Carrying charges collect in all cases.

All telegraph records can be reproduced at varying speeds on any talking machine, according to the adjustment.

Address all orders to J. B. Taltavall, Publisher, TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

IN THE YEAR 1783, Vincenti Lunardi made a balloon ascension over London, England. In that year French ballonists crossed the English channel.

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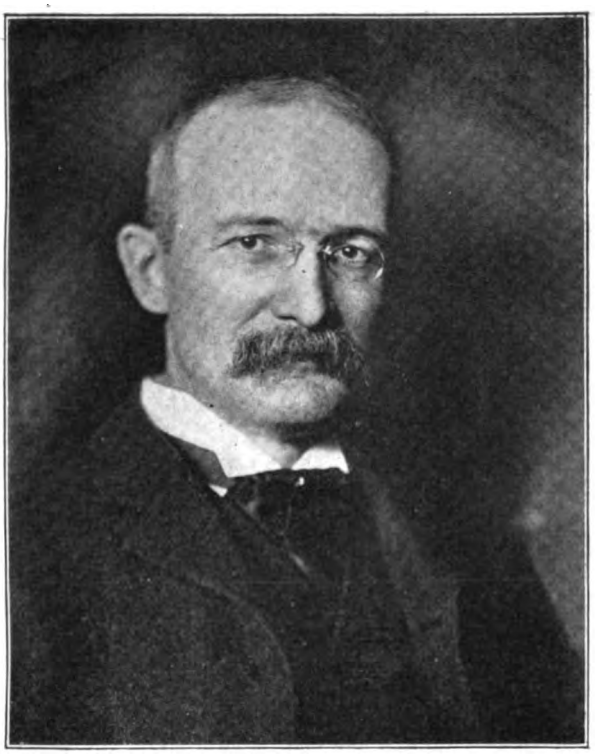
## THE TELEPHONE.

### H. B. THAYER
### Guest of Honor at Unique Dinner.

Some of Mr. Thayer's old friends and associates in the Western Electric Company tendered him a dinner on June 30, at the University Club in New York to commemorate his recent election as President of the American Telephone and Telegraph Company. The thirty-two men who sat around the table represented a total length of service amounting to 661 years, which is an average of slightly more than twenty years of service for each person.

The occasion was a memorable one, signaling as it did, Mr. Thayer's retirement from active direction of the company, after more than thirty-eight years of service, in order to take up his new work.



H. B. THAYER.

Vice-President Salt acted as toast master and the principal talk was delivered by the retiring president, who laughingly said that he felt he had made good what he had been scoffed at for many years for saying—that he would retire when he came to be sixty years of age. He then went on to speak in a reminiscent vein of the early days of the Company. He said that in the midst of all of the pleasant things which were being said about him he could not erase from his own memory some of the many mistakes which he had made. He remembered, he said, for instance, that in the days when he was a billing clerk he had roused the ire of one of the company's best customers by billing him for insulators at ten dollars apiece, instead of ten dollars a thousand, and somewhat later when he was handling service work, he had ordered a carload of cross-arms shipped by express.

He recalled also the time when Vice-President Salt, then the clerk handling the American Bell instrument reports, was scheduled to be discharged for his inability to keep his records straight. This prompted, Mr. Rockafellow, whose service dates back to 1884, to claim distinction of being the only man present at the dinner who had been "fired" by Mr. Thayer.

"I was supposed to be a stenographer," said Mr. Rockafellow, "and was assigned to take Mr. Thayer's work, but he talked too fast, and he didn't talk my language, so I didn't last long."

During the evening most of those present spoke informally, and it was interesting to see the representatives of each department in turn claim Mr. Thayer either as a graduate of, or as the originator of that particular department. Indeed, it developed as a fact that Mr. Thayer had at one time or another in his long service in the business been active in the buying, the selling, the engineering, the manufacturing, the patent work, the foreign business, the accounting and the legal, and in fact every department of the company's activities.

Many of those who spoke had, themselves, been hired by Mr. Thayer and all paid tributes to him, not alone of respect, but of loyalty and affection.

### Bancroft Gherardi,

CHIEF ENGINEER AMERICAN TELEPHONE AND TELEGRAPH COMPANY.

Bancroft Gherardi was born in San Francisco, April 6, 1873. He was graduated from the Polytechnic Institute of Brooklyn in 1891 with the degree of B.S., after which he went to Cornell, where he received the degree of M.E. in 1893 and M.M.E. in 1894.

In February, 1895, he began his telephone engineering work in the office of J. J. Carty, then engineer of the Metropolitan Telephone and Telegraph Company. His earliest work was the inspection and testing of cables, so at the very start he became familiar with the state of the art in regard to this important branch of the telephone plant. After doing this and other general work for some time, he was placed by Mr. Carty in charge of the material inspection work of the company.

In the fall of 1900 Mr. Gherardi was transferred to the traffic department of the New York Telephone Company. He created the first traffic engineering department of any operating company.

On January 1, 1901, Mr. Gherardi was appointed chief engineer of the New York and New Jersey Telephone Company. In March, 1906, the operating organization of the New York Company and the New York and New Jersey Company were consolidated, and at that time Mr. Gherardi became assistant chief engineer of both companies, reporting once more to his old chief, Mr. Carty.

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In May, 1907, when Mr. Vail became president of the American Telephone and Telegraph Company, he appointed Mr. Carty to the position of chief engineer of that company, and in connection with the reorganization of the engineering forces. Mr. Gherardi was appointed equipment engineer of the American Telephone and Telegraph Company, and in 1909 was appointed plant engineer of that company, in charge of all plant development and standardizing for the Bell System.

BANCROFT GHERARDI.

He has had his part in connection with the subway and cable from Boston to Washington, the lines from New York to Denver, and later the transcontinental line, and the development of wireless telephony.

For many years Mr. Gherardi has been connected with the American Institute of Electrical Engineers and has been taken a prominent part in its affairs.

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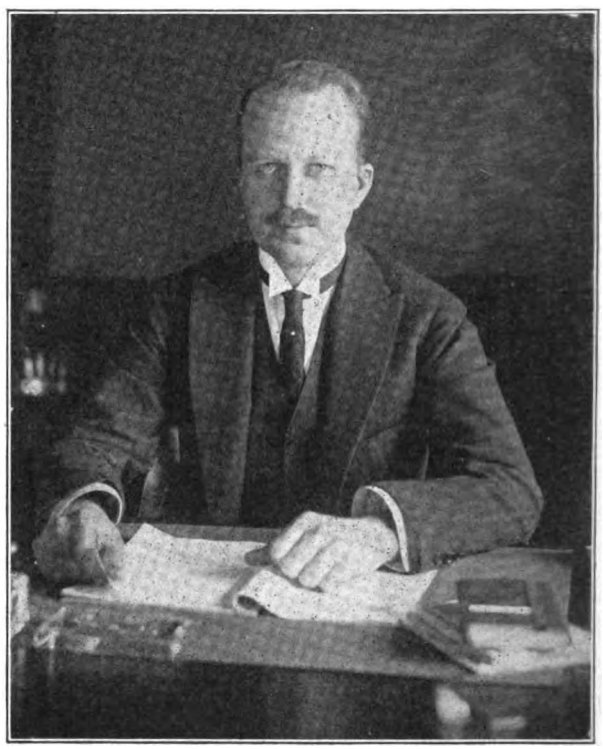
O. J. HUIE has been appointed acting chief engineer of the southern group of Bell Telephone companies, with headquarters in Atlanta, to succeed George J. Yundt, recently elected second vice-president of the companies. Mr Huie has been associated with the Southern Bell Company for a number of years. He is succeeded as outside plant engineer by T. H. Landraf, who was division engineer at Nashville.

## Walter Sherman Gifford.

Walter Sherman Gifford, newly elected vice-president of the American Telephone and Telegraph Company in charge of accounts and finances, was born in Salem, Mass., January 10, 1885. He is a graduate of Harvard University of the class of 1905. Mr. Gifford was assistant secretary and treasurer of the Western Electric Company at Chicago from 1905 to 1908 and from 1908 until December 1, 1916, was chief statistician for the American Telephone and Telegraph Company. At that time Mr. Gifford was loaned to the government and became



WALTER SHERMAN GIFFORD.

director of the Council of National Defense and Advisory Commission at Washington. He had served early in 1916 as supervising director of the committee on industrial preparedness of the Naval Consulating Board in connection with which he made an industrial inventory of more than twenty-seven thosuand business firms for the government.

At the end of the war Mr. Gifford was made comptroller of the American Telephone and Telegraph Company, succeeding Charles G. Dubois, who had been for some time in charge of accounting for the American Red Cross and has recently been elected president of the Western Electric Company.

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IN THE YEAR 1794, M. Reiser, at Geneva, Switzerland, arranged a telegraph line employing thirty-six insulated wires—a wire for each character used. At the receiving end, the characters being formed out of tin foil strips, the signals were read as sparks passed between the strips of each letter signaled from the transmitting end.

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# AMERICAN PRINTING TELEGRAPH SYSTEMS USED IN FRANCE

By E. C. Gibbons.

The first multiplex circuit in France was set up in April, 1918, between Chaumount (G. H. Q., A. E. F.) and Tours (Hqrs. S. O. S.) James M. Desmond from Minneapolis had charge of the Tours end of the installation and I had charge of the Chaumount end. This was a two channel circuit and at first was operated over a simplexed pair of telephone wires. Later on (in May or June, 1918) we used a composited wire exclusively. The second multiplex circuit was started soon after the first. It was a two channel between Chaumount and London, England. This circuit was first repeated at Le Havre and afterwards at Paris and Le Havre. The traffic handled on this circuit was mostly ten letter code destined to the United States. At the time of the signing of the armistice the following circuits were in operation: 1, 3-channel Tours-Chaumount, 1, 2-channel Tours-Chaumount, 1, 3-channel London-Chaumount, 1, 1-channel Stop-start (duplex) Paris-Chaumount, 1, 2-channel Paris-Tours, 1, 2-channel Paris-London, and one 2-channel Tours-London. All of these circuits were on composites and a very good speed maintained. The United States Army was the only user of the multiplex in France until early in 1919, when the Western Union commenced operation on a Paris-London 3-channel multiplex.

The French automatic telegraph specialists have been studying the multiplex for some time and at present there are ten of them that are very familiar with it. About five weeks ago I was assigned to the French to supervise the installation of multiplex sets in the French telegraph offices at Paris and Nancy and to assist the French attendants in the "reglement," etc. On account of insufficient battery at Nancy we were delayed considerably. On May 21 the first test was made on the best wire the French had (copper, about 8 gauge, and underground all the way from Paris to Nancy). We made a perfect test, doubling two channels at a speed of 53½ words per minute. On the following day we made a test using the poorest wire they had (iron). We obtained a speed of 45 words per minute on this wire with perfect results. On the third day we took a wire routed Paris-Belfort-Epinal-Nancy and then added 1,000 ohms line resistance at each end. Total resistance in line was 5,700 ohms. This circuit worked fairly good at 45 words per minute. Current was 13 milliamperes. The Director of the French Central Telegraph office in Paris was very much pleased with the operation and in his report on the subject stated that:

"The Americans completed their mission in a very satisfactory manner and that he was very pleased with the results." It is not known just how extensively the French will use the multiplex as the French manufacturers would prefer to have their product used in its place. Just to show what a field the multiplex would have if adopted, I give a list of the Baudot circuits from Paris:

| | Baudot's. | Channels each. | Wires. |
|---|---|---|---|
| Paris-Marseilles | 2 | 6 | 2 |
| Paris-Lyons | 2 | 4 | 2 |
| Paris-Le Havre | 2 | 4 | 2 |
| Paris-Brest | 2 | 4 | 2 |
| Paris-Lille | 1 | 6 | 1 |
| Paris-Fontainbleau | 1 | 6 | 1 |
| Paris-Bordeaux | 1 | 4 | 1 |
| Paris-Toulouse | 1 | 4 | 1 |
| Paris-Nancy | 1 | 4 | 1 |
| Paris-St. Etienne | 1 | 4 | 1 |
| Paris-Nice | 2 | 4 | 2 |
| Paris-Clermont-Ferrand | 1 | 4 | 1 |
| Paris-Montpellier | 1 | 4 | 1 |
| Paris-Cherbourg | 1 | 4 | 1 |
| Paris-Caen | 1 | 4 | 1 |
| Paris-Versailles | 1 | 4 | 1 |

The following are duplex circuits while the above are just simple telegraph circuits which can be used for either sending or receiving but no more than four receivings and no sendings or one sending and three receivings or two of each can be obtained from a four-channel Baudot.

Paris-Alger (repeaters at Marseilles), 2 triple duplex, 2 cables.

Paris-Oran (repeaters at Marsellies), 1 double duplex, 1 cable.

Paris-Constantine (repeaters at Marseilles), 1 double duplex, 1 cable.

There are a total of over 400 channels of Baudot (counting the way circuits) in the city of Paris and over 1,200 in service in France. Those in Paris require the attention of but one "mecanicien" to each trick. That is where they have it on us. The Hughes printer is used for circuits of the second order (to express it the way the Frenchman did). There are about 180 of these circuits in operation out of Paris with a total of about 800 in France. For very small villages and branch offices the continental Morse is used. In the branch office room in Paris there are only women operators and it is against the rules for others than officials to enter. 1,100 lines enter the Paris main office. The cable

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used from Marsellies to Alger (Franco-Anglais) is 931 KM. long (about 600 miles).

Very little work is done after midnight. There are about 1,700 women and 300 men employed in the Paris office. They made the remark about the Western Union received message holder that it would not hold enough messages. I placed about seven messages in it and then asked the chief what objection he had to that. He said that it wouldn't hold fifty or sixty messages as their hook does. It's a fact that the check girl makes her rounds every few hours and gets a large armful on each round. One example at Nancy: I happened to be standing near the Toul circuit (Hughes) and saw a couple of wire messages on the sending hook. Upon asking the operator how many he waited for before starting to send he replied that he had tried to attract the attention of the operator at the other end but there was no response. He then waited about 30 minutes longer and gave it another try. When he finally got rid of the messages they were nearly two hours' old. One of them was a message to the wire chief asking him to make a certain circuit good in his section. They think nothing of service at all. Those that are trying to hit the ball give up in disgust saying that it is the fault of the system. They get paid according to the length of service and not how well they work.

(The account here given of the introduction and use of the American multiplex printing telegraph system on lines in France, was forwarded by Lieut. Gibbons, of the United States Signal Corps, to M. A. Frye, engineer, of the division traffic department, Western Union Telegraph Company, Chicago.)

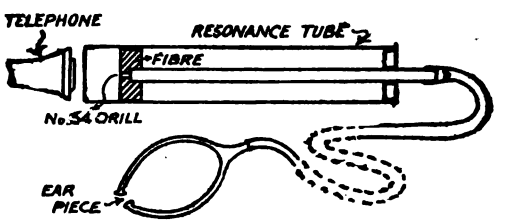
# Determining Harmonics Causing Telephone Interference.

In a recent issue of the *Electrical World,* F. T. Iddings describes a method of determining the harmonics in an alternating current power system that cause inductive interference in an adjacent telephone circuit. The figure shows the simple acoustic arrangement employed. It is essentially an organ pipe of adjustable vibrating length which can be brought into resonance with one of the harmonics of the humming diaphragm of a telephone receiver. From the distance between two consecutive nodal points, the number of vibrations of the sound may be computed, and this gives the frequency of the corresponding electric harmonic.

An exploring coil of 500 turns of No. 28 double cotton covered wire is used, wound in the tire groove of a 2-in. wooden bicycle wheel rim. The coil is paraffined, taped, varnished and supplied with terminals to receive the tips of a bipolar telephone receiver cord. This coil is placed in inductive relation to the source of the interfering currents, and a bipolar telephone receiver in series with the coil is placed before, yet not tightly against, the open end of the resonator tube described below.

The adjustable resonator is made of 1-in. outside-diameter brass casing 1/32 in. thick, 25 in. long, with piston of ¼ in. outside-diameter brass tubing 26 in. long, sliding through a hole in the cap on one end of the larger tube. Screwed onto the end of the small brass tube is a piston head of ¼ in. fibre, the bore of the small tube being continued through the piston head by a small hole (No. 54, Morse drill). The piston head must slide freely in the bore of the larger tube and yet fill the whole bore. On the end of the small tube which projects through the cap of the larger tube there is placed 2 ft. of flexible rubber tube terminating in ear pieces such as were used formerly with phonographs.

With a humming receiver near the end of the tube, the sounds due to the interfering currents are plainly heard through the ear tubes. If now the piston be withdrawn slowly into the tube, thus enlarging the resonating chamber, a point will be noted where a certain tone is much louder than at any other point. Still further withdrawing the piston, another resonant point will be found for each tone, about twice as far from the first maximum point as the first point is from the open end of the tube. The distance between the first and the second maximum points will be a half wave length of the harmonic. Doubling this length and dividing it by the distance which sound travels in one second, i, e., 13,440 in., will give the frequency of the harmonic.




Should there be two harmonics of prominence which are close together, say the eleventh and the thirteenth on a 60-cycle line, the result from the resonator will likely be the twelfth harmonic. This will be clear from the following table:

| Harmonic Number. | Half Wave-Length. |
|---|---|
| Eleventh.. .. .. | 10.18 inch |
| Twelfth .. .. .. | 9.33 inch |
| Thirteenth .. .. | 8.61 inch |

The ear will probably select as the centre of the maximum the point where the two harmonics overlap and thus get the average wave length, corresponding to the twelfth harmonic.

A resonator of the dimensions given would not give the half wave of a harmonic lower than the seventh on a 60-cycle system, viz., 420 cycles per second. To measure frequencies as low as the third harmonic on 60 cycles would require a tube 56 in. long.

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# FAST MORSE OPERATORS OF TO-DAY IN THE SERVICE OF THE WESTERN UNION TELEGRAPH COMPANY

Herman C Emrich, Portland, Ore. Medal winner at the National Tournament held in San Francisco, 1915. In 39 minutes and 27 seconds Mr. Emrich sent twenty commercial, and ten railroad messages, and 500 words uncoded press.

Walter Flynn, Cincinnati, Ohio. 102 messages per hour for eight hours. Monthly average, 75 messages per hour.

Harry H. Audley, Sioux City, Iowa. 93 messages per hour during one month. In one hour he sent 113 messages.

J. S. Hayden, Shreveport, La. 800 messages in 8 hours.

Arthur E. Harrow, Seattle, Wash. 87 messages per hour for 8 hours. 106 messages in one hour.

Robert C. Page, Charlotte, N. C. 953 messages in 9 hours. 88 messages per hour during one month.

Clarence E. Spann, Chicago, Ill. 895 messages in 9 hours.

John E. Donlon, Salt Lake City, Utah. His regluar average for an 8-hour period is from 550 to 600 messages.

Raymond Wright, Norfolk, Va. Has sent 64 messages in 30 minutes, received 131 messages in one hour, and handled 845 in 9 hours.

R. C. Kelly, Pittsburg, Pa. 99 messages per hour for 8 hours.

John E. Costello, Syracuse, N. Y. 78 messages per hour for 9 hours. 92 messages in one hour.

Chester Vankeuren, Toledo, Ohio. Totaling up his hours worked and messages handled in a three-year period, he had handled an average of 61 messages per hour.

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C. A. Jennett,
New York.
86.1 messages per hour during 117 hours. In 8 hours handled 717 messages.

Lloyd Aldrich,
Detroit, Mich.
65 messages per hour for one month.

George O'Connor,
Denver, Colo.
619 messages in 8 hours. 55 messages per hour for one month on the long Denver-New York circuit.

F. J. Reilly,
El Paso, Tex.
55 messages per hour for 22 consecutive hours.

Edward Gibbons,
Philadelphia, Pa.
Averaged 65 messages per hour for several months on a Philadelphia-New York circuit; at times reaching 100 per hour.

E. J. Frieberger,
St. Louis, Mo.
74.2 messages per hour for 144 hours.

Otto Becker,
Fargo, N. D.
65 messages per hour for one month.

Harry B. Cutlip,
Cleveland, Ohio.
73 messages per hour for one month.

Arnold Amundson,
Duluth, Minn.
59 per hour for one month; in one hour handled 89 messages.

Walter E. Erion,
Milwaukee, Wis.
His monthly average is consistently from 42 to 49 per hour.

William C. McCormick,
San Francisco, Cal.
He was the operator who handled the Corbett-Fitzsimmons prize fight at Carson City, Nev., in 1900.

Thomas Johnson,
Atlanta, Ga.
92 message per hour for one month. 906 messages in 8 hours.

*The performances here recorded of rapid Morse sending and receiving by Western Union telegraphers show that the Morse operators of the present time are as expert as the tournament winning star operators of old. The time will soon be at hand for another National Fast Sending Telegraph Tournament at which the awards shall undoubtedly be substantial. The next tournament should, perhaps, be held in Chicago, in order to insure participation of experts from all parts of the country.*

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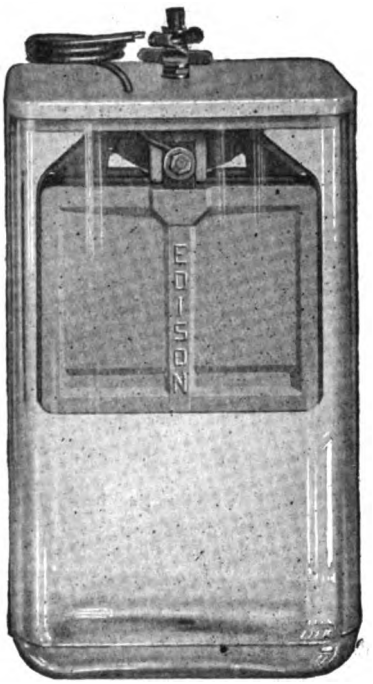
# FOR CLEAR TRANSMISSION




EDISON PRIMARY BATTERY DIVISION

THOS. A. EDISON, INC.

BLOOMFIELD, N. J.

# HALL SWITCH & SIGNAL CO.

**GARWOOD, N. J.** **CHICAGO**

*MANUFACTURERS OF THE*

## *GILL SELECTOR*

**THE UNIVERSAL SELECTOR FOR TELEGRAPH AND TELEPHONE**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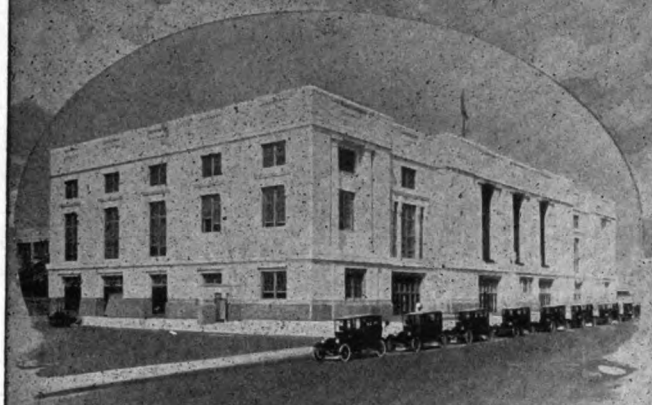
# KERITE



UNION TERMINAL
DALLAS, TEXAS

KERITE INSULATED WIRE & CABLE COMPANY
NEW YORK CHICAGO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## THE RAILROAD.

A MEETING of Committee No. 6, message traffic, of the Telegraph and Telephone Division, American Railroad Association is to be held in Chicago, August 20.

H. HULATT, manager of telegraphs, Grand Trunk and Grand Trunk Pacific Railways, was in New York on business August 1 and 2, leaving for Chicago and the west, August 3.

THE COMMITTEE OF DIRECTION of the Telegraph and Telephone Division of the American Railroad Association, consisting of M. H. Clapp, chairman; J. F. Caskey, first vice-chairman, and H. Hulatt, second vice-chairman, held a meeting in New York, August 1 and 2.

GEORGE C. KINSMAN, formerly and for many years superintendent of telegraph of the Wabash Railroad system with headquarters at Decatur, Illinois, for the past ten years living in retirement at Yorba Linda, Calif., was a New York visitor the latter part of July. Mr. Kinsman made his trip east the occasion to call on many of his old friends.

STANLEY RHOADS, telegraph and telephone engineer of the New York Central Railroad, has been granted a United States patent (No. 1,309,369) covering the invention of an answer back signal for telegraph wires equipped with selectors.

THE TELEGRAPH AND TELEPHONE ENGINEERS and construction foremen of the New York Central Railroad, Michigan Central Railroad, and associated lines held a business conference in Buffalo, July 29-30.

MISS ANNA BENSON, day chief operator, and Miss Evelyn Zantow, night chief operator, general telephone office, telegraph department, Southern Pacific Railroad, Los Angeles, Cal., were New York visitors from July 20 to 25. Misses Benson and Zantow came east over the southern route and returned to California by way of Buffalo, Chicago and Salt Lake City.

RUTH MCINTOSH, daughter of L. C. McIntosh, chief operator in the main office of the Southern Pacific Railroad, Los Angeles, Cal., was on August 12 married to Clarence Shaw.

### Chicago and North Western Railroad.

CAPTAIN WALTER S. JOHNSTON recently returned from overseas with a well earned decoration, formerly chief operator and dispatcher of the Galena Division, has returned to service and has been appointed train master of the East Iowa Division, at Belle Plaine, Ia.

HARRIS M. MCFARLANE, recently returned from overseas military service, has resumed his duties as lineman in the telegraph department, on August 15, taking charge as district foreman, Western lines.

CHARLES A. DILLEY, of Superintendent of Telegraph William Bennett's office, Chicago, on July 25, met with a serious accident while boarding a suburban train at Kenmore, Ill. His right foot was so badly crushed that amputation was necessary.

### Telegraph and Telephone Division, American Railroad Association.

At the July meeting of the Committee of Direction of the Telegraph and Telephone Division, American Railroad Association, held in New York, action was taken in regard to the work of the Division during the coming year. Also, committee chairmen and members were appointed to serve during the year.

The following is a report of the deliberations of the Committee of Direction:

GENERAL PROGRAM OF RULES. REGULATIONS AND SPECIFICATIONS TO BE WRITTEN OR COMPILED BY THE DIVISION.

It was the unanimous opinion of the committee that it is desirable to have a general program of rules, regulations and specifications to be written or compiled by the Division. In this connection, it was decided that a special committee should be appointed to give consideration to the subject and report to the Committee of Direction at a subsequent meeting.

G. A. Cellar was selected chairman of the special committee. Mr. Cellar was given authority to appoint the members of the committee, it being understood that all sections of the country will be represented.

THE DESIRABILITY OF ADOPTING GENERAL RULES FOR COMMITTEE WORK, AND HANDLING REPORTS OF THE COMMITTEES AT THE MEETINGS OF THE DIVISION. IN CONNECTION WITH THESE SUBJECTS, THE FOLLOWING POINTS ARE TO BE CONSIDERED:

(a) The desirability of limiting the debate at all meetings so far as practicable to general principles.
(b) Character of resolutions to be presented to meetings of division by chairmen of different committees. Should they be confined to one subject and printed and sent out with the reports of committees?
(c) Define general specifications.
(d) Define detailed or manufacturing specifications.
(e) Define "designated authority", "approved types", "approved letters" and "approved equivalents." To what extent should the superintendent of telegraph be mentioned in the specification as the official approving certain standards and practices?

It was decided to appoint a temporary committee to consider the activities outlined in the foregoing docket and report to the Committee of Direction at its next meeting.

The following committee was appointed:

E. C. Keenan, (chairman); J. F. Caskey, I. C. Forshee, A. P. Linnell, Stanley Rhoads, L. S. Wells.

Committee No. 1—Construction and Maintenance, Outside Plant, Martin H. Clapp, manager, Telegraph Section, United States Railroad Administration; E. A. Burkitt, foreman, Illinois Central Railroad; F. T. Caldwell, division superintendent

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telegraphs, Grand Trunk Railway; G. A. Cellar, superintendent of telegraph, Pennsylvania Lines West of Pittsburg; E. A. Chenery, general superintendent telegraph, Southwestern Region, United States Railroad Administration; R. E. Chetwood, plant engineer, Western Union Telegraph Co.; G. A. Dornberg, chief lineman, Pennsylvania Lines West of Pittsburg; E. C. Keenan, general superintendent telegraph and telephone, Eastern Region, United States Railroad Administration; J. McMillan, manager of telegraphs, Canadian Pacific Railway; J. C. Rankine, superintendent telegraph, Great Northern Railroad; J. J. Ross, superintendent telegraph, Michigan Central R. R.; B. J. Schwendt, superintendent of telegraph and signals, Toledo & Ohio Central R. R.; L. S. Wells, superintendent telegraph and electricity, Long Island R. R.; Martin H. Clapp was appointed chairman.

The following instructions to Committee No. 1 were agreed upon:

(a) Continue work on pole line specifications with a view of presenting the specifications for final adoption at the annual meeting in September, 1920.

(b) Get together a first draft of a revised specification covering signal wire crossings over railroads with a view of presentation to the December meeting of the Division.

(c) Get together supplementary specifications to the general underground specifications already adopted to cover in detail the indefinite features of the general specification. These specifications need not be of any considerable length, covering only definite values, such as the exact location, class of construction, type of material, municipal requirements, etc. Also, the committee should make a beginning in preparing detailed specifications covering certain classes of material used in underground construction.

(d) Complete the transposition specifications, with a view of presenting to the December meeting of the Division this year for final adoption."

Committee No. 2.—Construction and Maintenane, Inside Plant.

R. F. Finley, superintendent telegraph, New York Central R. R.; A. Behner, engineer telegraph department, New York Central Railroad; J. H. Brennan, superintendent telegraph, St. Louis and San Francisco R. R.; A. W. Douglas, assistant superintendent telegraph, Chicago, Rock Island & Pacific R. R.; H. W. Drake, apparatus engineer, Western Union Telegraph Co.; I. C. Forshee, electrical engineer, Pennsylvania R. R., Eastern Lines; George K. Heyer, assistant telephone sales manager, Western Electric Co.; R. R. Hobbs, superintendent telegraph, Louisville & Nashville R. R.; T. Rodger, superintendent telegraphs, Grand Trunk Railway; W. Rogers, telegraph and telephone engineer, Southwestern Region, U. S. R. R. A.; G. R. Stewart, general wire chief, Illinois Central R. R.; C. A. Worst, superintendent of telegraph, Chicago, Burlington & Quincy R. R.; W. S. Wood, division supervisor of equipment, Western Union Telegraph Co.

Mr. Finley was appointed chairman.

The following instruction to Committee No. 2 was agreed upon:

"Continue work already begun with a view of presenting specifications for final adoption to the meeting of the Division in September, 1920."

Committee No. 3—Protection Against Electrolysis — Wm. Bennett, superintendent telegraph, Chicago & N. W. R.R.; R. F. Hosford, American Telephone and telegraph Company; P. J. Howe, construction engineer, Western Union Tel. Co.; L. A. Lee, superintendent telegraph Pittsburg & Lake Erie R. R.; G. O. Perkins, superintendent of telegraph and signals, Chicago Great Western R. R.; L. D. Shearer, superintendent telegraph, Phila. & Reading R. R.

Mr. Bennett was appointed chairman.

The following instruction to Committee No. 3 was agreed upon:

"Keep in touch with electrolysis work in general and be prepared to make any recommendations that may seem necessary to keep instructions already adopted up to date."

Committee No. 4, Protection Against Lightning and Electric Light and Power Circuits:

J. F. Caskey, superintendent of Telegraph, Lehigh Valley R. R.; L. Behner, engineer telegraph department, Pennsylvania R. R. Lines West; W. L. Cook, president, Reliable Electric Co.; H. W. Drake, apparatus engineer, Western Union Telegraph Co.; I. C. Forshee, electrical engineer, Pennsylvania R. R., Eastern Lines; W. M. Gould, American Telephone & Telegraph Co.; Stanley Rhoads, telephone and telegraph engineer, Eastern Region, U. S. R. R. A.; H. A. Shepard, superintendent of telegraph, New York, New Haven & Hartford R. R.

Mr. Caskey was appointed chairman.

The following instruction to Committee No. 4 was agreed upon:

"Continue work already begun with a view of getting into form for final adoption at the annual meeting in September, 1920."

Committee No. 5—Telegraph and Telephone Developement:

J. A. Jones, superintendent telegraph, Southern Railroad Lines, East; J. C. Armstrong, superintendent telegraph, Pennsylvania R. R., Eastern Lines; A. C. Barfield, manager, Harland Engineering Co.; E. E. Dildine, superintendent of telegraph, Northern Pacific R. R.; B. A. Kaiser, American Telephone and Telegraph Co.; C. A. Plumly, superintendent telegraph, Baltimore & Ohio R. R.; D. McNicol, Editor, TELEGRAPH AND TELEPHONE AGE; David Sarnoff, commercial manager, Marconi Wireless Telegraph Company of America; S. L. Van Akin, Jr., assistant superintendent telegraph, New York Central R. R.

Mr. Jones was appointed chairman.

The following instruction to Committee No. 5 was agreed upon:

"Keep in touch with the various railroad telegraph and telephone and wireless companies and equipment manufacturers, with a view of reporting anything new, useful and interesting that may be developed in connection with the telegraph and telephone."

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Committee No. 6—Message Traffic:

H. Hulatt, manager of telegraphs, Grand Trunk Railway System; F. E. Bentley, superintendent of telegraph, St. Louis—East St. Louis Terminal District; H. C. Chace, superintendent telegraph, Atchison, Topeka & Santa Fe R. R.; P. F. Frenzer, superintendent telegraph, Union Pacific R. R.; W. H. Hall, superintendent telegraph, Missouri, Kansas & Texas R. R. Lines; R. R. Hobbs, superintendent telegraph, Lousville & Nashville R. R.; G. D. Hood, superintendent telegraph, Chicago, Rock Island & Pacific R. R.; E. L. King, superintendent telegraph, Southern Pacific R. R.; A. P. Linnell, traffic supervisor, telegraph department, Grand Trunk Railway System; F. T. Wilbur, superintendent telegraph, Illinois Central R. R.

Mr. Hulatt was appointed chairman.

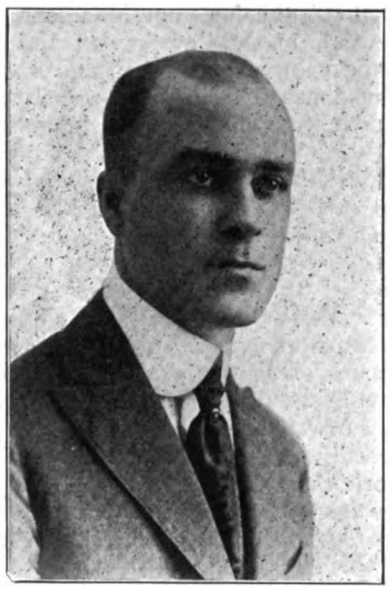
The committee is to develop very thoroughly the various traffic problems.

# INDUSTRIAL

## O. F. Cassaday.

It seems that every telegraph and telephone engineer in the country knows O. F. Cassaday, at one time superintendent of equipment for the United States Telephone Company at Columbus, Ohio, and in recent years sales engineer in the service of the Kellogg Switchboard and Supply Company, Chicago.

In his long service as field representative of a



O. F. Cassaday.

large manufacturing company Mr. Cassaday was able to acquire an enviable reputation as sales engineer qualified to serve the interests of his company and at the same time render valuable service to those whose wants he cared for.

Mr. Cassaday has had wide experience in the telegraph, telephone, and electric light fields. In the service of the United States Telephone Company he did a large amount of estimate and appraisal work, and special engineering in connection with automatic telephone work.

Among his friends on the western railroads in the telephone service Mr. Cassaday is familiarly known as "Duke". Tradition has it that when he was Huckleberry Finn's age his favorite volume was a ten cent edition of "The Duke's Revenge".

On July 1, Mr. Cassaday resigned from the Kellogg Company's service and has become Western representative of the L. S. Brach Mfg. Co., with headquarters at Chicago.

## Samuel Tierney, Jr.

In connection with development work in its signal and lightning arrester departments, the L. S. Brach Mfg. Company of Newark, N. J., has recently added Samuel Tierney, Jr., to its technical

Samuel Tierney.

staff. Mr. Tierney was born in Paterson, N. J., graduating from the local high school and from Stevens' Institute of Technology, receiving the M. E. degree in 1907. His first practical experience was received at the shops of the Erie Railroad at Hornell, N. Y., in locomotive erection and repair work. From 1909-12 he served the United States government in Washington, D. C., in the geodetic survey and bureau of standards as engineer in the testing of engineering instruments and materials. For three years he served the Toronto Gas Company as engineer and chemist, directing the plant operations of their largest works, leaving in 1916 to spend a year in special work at Columbia University. During 1917-18, he was engineer for Foote Pierson and Company of New York, manufacturers of telegraph instruments, fire alarm apparatus and electrical specialties.

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### Ford Mica Company.

Mica as an insulating property—in sheet, segment, plate, disc or washer form—plays an important role in the present-day electrical field. In telegraph, telephone, cable and radio apparatus, such as condensers, switchboards and telephone receivers, its use is invaluable.

The Ford Mica Company of New York City, of which Mr. James Gill is president, supply a large amount of this commodity of a very superior quality, to makers and users of electrical apparatus, and are in a position to furnish such concerns with either the domestic or imported mica, cut or uncut, in any size or form.

### New York Insulated Wire Cmpany.

The New York Insulated Wire Company, whose factory is in Wallingford, Conn., supplies cable, telegraph and telephone companies and other communication interests with a high grade quality of rubber covered wire and cable. Two of the company's best known brands—Raven Black Core and Grimshaw Black Core—are in use by railroad signal departments and municipal police and fire lines in all parts of the country.

Grimshaw, and Competition black insulating tapes—both excellent products—are also manufactured by this long established company.

### Louis Steinberger.

In a recent issue of *Our Army and Navy*, published in Washington, appeared an article in which the editor in chief of that journal paid a high tribute to Louis Steinberger, president and general manager of the Electrose Manufacturing Company of Brooklyn, N. Y., for work done in connection with the electrical needs of the Government during the war. The entire facilities and resources of the company's large factory were placed at the disposal of the War and Navy departments, and Mr. Steinberger personally gave his time and attention to concentration of efforts upon Government needs.

### Telegraph Operators for Siberia.

The War Department, Washington, on July 21, issued a call for fifteen qualified telegraph operators to be sent to the Siberian Replacement Detachment, United States Army, Presidio, San Francisco, Cal., for service with the American army in Siberia. The recruiting officer stationed in any city is authorized to receive applications for these positions.

### Franklin's Experiment Dangerous.

At Scranton, Pa., on July 27, while emulating Benjamin Franklin and flying a kite during a thunder storm, Andrew Loyak was killed by a charge of electricity which traveled along the wet string from its upper extremity to the hands of the holder. Loyak's death was instantaneous.

### "The Quick Brown Fox."

The sentence, "The quick brown fox jumps over the lazy dog," which contains all of the letters of the alphabet and which is widely used in telegraph printer circuit tests, is still in vogue; but the sentence, "Pack my box with five dozen liquor jugs," which also contains all of the letters, has been taboo since July 1.

### "The Night Operator."

Telegraphers who enjoyed reading "The Wire Devils" will welcome this new book by Frank L. Packard. The book contains a number of short stories written about the alluring game of railroading; the first story, "The Night Operator", is also the title of the book.

In "The Night Operator" you will follow with spell-bound interest a panorama of rushing mountain rivers and dangerous curves, of brave men responsible for the safety of others, who meet their obligation with high hearts and abounding courage.

And when the book is read you will recall with delight "Toodles," the spunky little night operator, "Royal Carlton," the big superintendent, "Regan," the purposeful master mechanic, and "Timmy O'Toole," the valorous Irishman, and say to yourself, "Packard has done it again; written another breathless adventure story; I hope he goes on writing them."

The price of the book is $1.50 net. For sale by TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

### A Concert by Wire.

At Saratoga Springs, N. Y., recently a public entertainment was given in which the audience occupying the seats in the theatre listened rapturously and wonderingly to vocal selections rendered by a quartette supposedly stationed hundreds of miles away in New York City.

On the stage was stationed a telegraph operator in charge of a Morse key, relay and sounder by means of which he telegraphed, so all could hear, to the New York singers, telling them when to begin and when to respond to encores.

When the concert was over and the audience were unanimous that they had witnessed a wonderful demonstration of the telephone's possibilities, a curtain at the rear of the stage was parted disclosing the singers, who from the rear had been singing into tubes; the tubes having been extended to the front of the stage in a manner to avoid detection from the auditorium.

The arrangements were made by W. B. Eddy, special agent for the New York Telephone Company, Albany, N. Y., assisted by Morse operator, Walter Fuller.

HAVE YOU READ ALL OF THE ADVERTISEMENTS IN THIS ISSUE OF TELEGRAPH AND TELEPHONE AGE? LOOK THEM OVER: THEY CONTAIN OPPORTUNITIES.

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# Experience of Military Telegraphers During the Civil War

In an editional printed in the April 1 issue of TELEGRAPH AND TELEPHONE AGE entitled, "The Telegrapher in War," reference was made to operator C. W. Jaques.

Mr. Jaques is now a resident of Ashtabula, Ohio, and contributed the following story of some of his experiences as a military telegrapher in the great conflict. His story will be particularly interesting to Signal Corps telegraphers now returning from the battlefields of France and Belgium.

Mr. Jaques says:

"I was night operator in the superintendent's office of the Pittsburgh, Fort Wayne and Chicago Road in Pittsburgh when the war began. Andrew Carnegie's brother, Thomas, was night operator for the Pennsylvania Road. Our offices were near each other and Tom and I were great chums. We would get together and pass away the few hours in the afternoon before going to work. There was a young ladies' seminary nearby which let out about 3:30 P.M. and we were always on hand to visit with the girls."

"Tom told me that his brother Andrew had been called to Washington to organize the military telegraph service, and had taken four operators from the Pennsylvania Railroad. I telegraphed to Carnegie, making application and received a reply to come to Annapolis, Md., and report by wire to him at Washington. I packed my trunk and sent it home; took what things I thought a soldier would need and started for Annapolis. I went from Perryville on the old ferry boat *Maryland* and arrived at Annapolis early in the morning; sat up all night and was cold, hungry and homesick.

### DOUBLE-CROSSED.

"I hunted up the telegraph office at Annapolis and the operator was just going out to breakfast. He said if I would stay there until he came back he would give me my breakfast. After he had been gone about ten minutes two soldiers appeared at the door and put me under arrest. They took me to Major General B. F. Butler, who was cross-eyed, and you could not tell whether he was looking at you or not. The operator had been caught asleep and these guards had been sent to arrest him—but they got the wrong operator, I was not allowed to explain the matter, and was told I would have to be shot.

"I went on to Washington and after investigation was detailed for Service. I think I was the fifth or sixth operator to go into military telegraph service.

"I was sent to Chain Bridge, where there was a small guard of cavalry on one end of the bridge, and the Confederates were at the other end of the bridge. We used to meet each other half way across the bridge and they would tell us how they were going to take Washington and we would say how we were going to capture Richmond.

"Our troops captured Alexandria. I was sent to Alexandria and opened the first military telegraph office in the Southern Confederacy. I stayed there until the first Battle of Bull Run. When our troops went out to that battle, I was sent to a little station called Springfield on the Orange and Alexandria Railroad. It was about twenty miles south of Washington and eight or nine miles south of Alexandria and the nearest telegraph office to the front at the Battle of Bull Run. Mr. Carnegie had arranged couriers between the telegraph office and the front. My wire ran into the War Department office in Washington. The President, Secretary of War, and all other officials who could get in, were in the War Department office for news.

### ON THE FIRING LINE.

"They kept me very busy inquiring whether the firing was growing more distinct or not, so they would know whether the troops were getting farther away or not. In the afternoon we had not had any couriers bring any messages, and the troops began to retreat along the railroad. The War Department ordered me to call in any one I could get to stop long enough to answer a few questions. They would get all of the information possible from this man, then let him go, and call in another. That kept up until it became dark, and I told the War Department by wire that there was nobody going by and I would close the office.

"A telegram then came for me, reading: 'If you keep your office open until you have permission from the War Department to close it, you will be suitably rewarded; if you close without such permission, you will be shot? I did not want to be shot, so I stayed on through the night, and heard a telegram go to the engine foreman at Alexandria to get an engine ready to bring in the operator from Springfield. I thought he never would get that engine ready—then another telegram was sent telling him to hold the engine for further orders. They kept me there until our army was back in their entrenchments in and around Washington and Alexandria because they knew as long as they could reach my telegraph office that the Southern army was not following up our troops, which they would have done if they had not been in as great a panic as our own troops.

### REWARDED.

"I went to Washington and hunted up Colonel Scott. He put his hand on my shoulder and asked me who I was. I told him I was the operator at Springfield, and he looked at me as if he thought the operator at Springfield ought to be about eight

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feet tall. Colonel Scott asked me where I came from. I said that Mr. Carnegie brought me down. He took me into the office of the Secretary of War. They gave me leave of absence for two weeks and paid me off for May, June and July three months—at the rate of $60 per month, in $20 gold pieces. I started home and stopped at Pittsburgh to see the girls, then went to my home in Mansfield, Ohio, and went back to Washington at the end of the two weeks.

"With the help of soldiers I built a telegraph line from Alexandria to Seminary Hill, the headquarters of General W. B. Franklin's division. I remained at Franklin's headquarters until General McClellan was brought to Washington and made Commander-in-Chief of the Northern armies. Then I was taken to Washington, and was one of three operators at the headquarters of the Army of the Potomac all of the time that Generals McClellan and Burnside had command of that army. The manager of the office was Mr. Thos. T. Eckert, who was later an Assistant Secretary of War and then president of the Western Union Telegraph Company.

"The man who originated the cipher code that was used by the government during the fore part of the war, was Anson Stager from Ashtabula, Ohio. I was the youngest operator in the office.

"For some reason they did not have a telegraph office in the White House. McClellan's headquarters was in the Club House, just across Pennsylvania Avenue from the White House. When any important telegram came in, or when important news came over the line they would very often send me over to the White House with the news to the President or to tell him that there was news at the telegraph office. The President very often would say, 'Glad to see you my boy, and I will go with you.'

### WALKED WITH LINCOLN.

"I remember a number of times that I started out with President Lincoln (the men wore large shawls) and he would take me under his shawl and walk over to the telegraph office with me. It seems wonderful to think I was personally so well acquainted with Lincoln. He and Secretary Seward used to come to McClellan's headquarters every evening. Our telegraph office was in the front room of the building so it was necessary for them to pass through the telegraph room to get to McClellan's private office. Sometimes, if the General was busy, they would visit in the telegraph office. We had wires running to Alexandria and to each division headquarters. The telegraph office was the only place that Lincoln could go to get away from the public. No one was allowed to follow him to the telegraph office, so he spent more of his time in the telegraph office at McClellan's and later in the War Department, than he did in any other place excepting the White House. Sometimes he would be there very late at night.

"About the time of the capture of Fort Henry, and Fort Donelson, and the naval expedition up the Mississippi river to New Orleans, President Lincoln almost lived in the telegraph office. The draft of the emancipation proclamation was written on the table in the telegraph office.

### MCCLELLAN LEAVES WASHINGTON.

"General McClellan's army left Washington and went at once to Fortress Monroe and his headquarters went down on the steamer *Commodore*. There were eight military operators on board the boat, and I am the only one of the eight now living.

"I was very much attached to McClellan. Our telegraph office always had to be close to the General's tent. It was necessary that the cipher operator be with the General at all times, and he was often called the 'General's Shadow,' because no one was allowed to have the cipher book except the military operators, even none of the other officers. It was impossible to tell at what moment a telegram of importance might come and the operator had to be on hand to translate it.

"I had a fine opportunity to get acquainted with the various generals and officers, among whom were the two Orleans French princes, the Comte D. Paris (who was said to be the rightful King of France) and his brother the Duc D. Charties, third son of Louise Phillip; also the Prince Dejoinville, and Col. John Jacob Astor of New York; all of whom were attached to General McClellan's staff.

"McClellan was relieved and Burnside took command of the Army of the Potomac. Later, when Burnside was transferred, I was sent with him to Cincinnati. He was then commander of the Department of the Ohio. I was cipher operator at Burnside's headquarters and was very close to Burnside. He could not have been kinder to me if he had been my father. When we were at Knoxville, we were 200 miles from our base of supplies at Danville, Ky., and there were no railroads; all mail was sent by courier, and the country was filled with guerrillas. Our telegraph lines were often torn down. Burnside was very punctual in writing to his wife, and finally arranged with the War Department to Furnish Mrs. Burnside with one of our cipher books. I had the other copy, so I had to translate all letters from his wife, and when he wrote to her, I had to put it in cipher. We would often be busy half the night with these letters.

### THE ATTACK ON LONGSTREET'S ARMY.

"Longstreet's corps left the army near Chattanooga to capture Burnside's Army at Knoxville, and reached the London river about twenty miles south of Knoxville. They had their pontoon bridges and the infantry across the river, protected by artillery on the other side. General Burnside and his staff held a council of war in a little log house. It was decided to attack Longstreet's army that night and orders had been issued and the officers were just about to disperse when a courier came in with a telegram. I opened it up—Burnside

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told the other general to wait. It was a telegram from General Grant to Burnside to draw Longstreet across the river and up near Knoxville. The telegram was sent out by three couriers; only one got through and he arrived just in time. Burnside began to retreat back to Knoxville. Longstreet followed him and for thirty days we were entirely surrounded at Knoxville, and, with Longstreet's corps away, General Grant fought and won the Battle of Missionary Ridge.

WOUNDED.

"I went with General Sanders, who was Burnside's chief of cavalry, as a volunteer aide, and was with him when the Southern troops charged his position, General Sanders being shot through the breast, dying that night. I was wounded, but not seriously, was laid up for a few days. Sanders was holding this position until completion of the Fort near Knoxville. The fort was named Fort Sanders. Later Longstreet called for volunteers and three brigades volunteered to charge Fort Sanders. My telegraph table at this time was a barrel head. The advance was made that morning, and the flag was mounted on the parapet of the fort three times. Three hundred dead men were taken out of the ditch of the fort. I had wired each time they placed the flag there, and the last time a shell cut the line and Burnside thought the fort was captured and sent for his few reserve troops. They came immediately and helped to prevent the enemy from coming in.

"These are some of the unusual experiences I had. Other operators probably had the same, or perhaps more exciting experience than I had.

There were, all together, 1500 military operators, and the government built over 15,000 miles of telegraph wire, and took possession of all lines as they needed them.

"After General Burnside's corps went back to the Army of the Potomac I was sent as cipher operator to General Sherman's headquarters at Nashville, Tenn., and remained there until Sherman's Army commenced the Atlanta campaign, during which I was with Generals McPherson, Logan and Howard."

## THE BALTIMORE RIOT OF 1861.

### One Wire Into Washington.

There is one situation in which a telegraph operator may find himself which, as time goes on, becomes less likely to recur—that is, the experience of being the operator in charge of the only circuit existing between two large cities while momentous events are taking place in each of them. Today the number of wires and the duplication of routes of lines are so extensive that the isolation of a large city would be practically impossible.

There is still living, in the city of Washington, D. C., the operator who for nearly forty hours worked the only intact circuit between Baltimore, Md., and Washington during the riots which occured in Baltimore, April 19 and 20, 1861. The name of this famous telegrapher is A. J. Lombard. The riot started when the Sixth Massachusetts regiment en route to Washington was passing through Baltimore, and the street fighting which followed created a situation which was very serious for the government.

One of the first acts of the leaders of the rioters was to cut the telegraph wires extending from Baltimore to Washington. At that time the Washingon office of the American Telegraph Company was in the National Hotel. The American company had the only telegraph office in Baltimore, the staff consisting of five Morse operators and two House printer operators. In the violent and hasty wrecking of the Baltimore telegraph office the mob overlooked one Washington wire. The main office on the first floor was closed, but the manager, discovering that one circuit remained intact called for volunteers to take instruments and go to an upper story of the building where the wire passed through, for the purpose of reestablishing communication with the War Department at Washington. The volunteer telegrapher was A. J. Lombard—then but a boy—and the messenger, James McColgan.

Lombard worked a House printer and maintained for forty hours a continuous communication between Mayor Brown of Baltimore and the War Department at Washington, in an endeavor to provide arrangements for the safe passage of Northern troops through the streets of Baltimore. Lombard and McColgan were rightly regarded at the time as the heroes of the occasion as it is certain that had they been discovered by the rioters their lives would have paid for their undertaking.

General Superintendent Taff, of the Western Union Washington district, has in his office a picture of the famous House printing telegraph instrument which operator Lombard used at Baltimore. At the Washington end of the circuit were Manager Talcott, and operators Noyes and Royce.

Later in life Jim McColgan, the messenger, became a prominent lawyer, and has since died. Also, the other telegraphers connected with this episode have passed to the great beyond, with the exception of Mr. Lombard.

Mr. Lombard retains a very clear recollection of the events which rapidly took place during the great riot, and as an evidence that the famous veteran has kept in close touch with the telegraph during the intervening fifty-eight years it may be added that in a recent letter to TELEGRAPH AND TELEPHONE AGE he says that while he was in the attic operating his telegraph machine, without sleep, and with little to eat during nearly two whole days and nights there was at least "I I I (gx)."

**Books on Wireless.**

TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York, is headquarters for all books on wireless telegraphy. Those desiring such books should send for our price list. We make it our business to fill all orders the same day they are received.

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## Standardization of Relay Nomenclature.

PROPOSED LIST OF TERMS SUBMITTED BY A. I. E. E.

At the annal convention of the American Institute of Electrical Engineers held on June 24 to 27, a list of terms relating to transmission-line relay protection was submitted for discussion by H. R. Woodrow, D. W. Roper and P. MacGahan. It has been found that the nomenclature employed by different manufacturers and operating companies are not in accord, in fact, often differ to such an extent as to cause ambiguity and misunderstanding. It is to overcome this that the following nomenclature has been proposed:

PROPOSED RELAY NOMENCLATURE.

*Electric Protective Relay*—An intermediate device by means of which one circuit is indirectly controlled by a change in conditions in the same or other circuits. The relay is ordinarily equipped with contacts to open or close an auxiliary circuit.

*Directional Relay*—Any relay which functions in conformance with direction of power or voltage or current or phase rotation, etc.

*Power-Directional Relay.*—Any relay which functions in conformance with direction of power.

*Note*—This includes both uni-directional relays with single-throw contacts and duo-directional relays with double-throw contacts. The reason this name is preferred to "reverse power" is that the device is frequently used to function under normal direction of power. Furthermore, in some cases the normal condition of the system may permit power to flow in either direction. Relays for use in either alternating or direct current circuits are to be classed as power-directional relays.

*Polarity-Directional Relay*—Any relay which functions by reason of a reversal of the normal direction of polarity.

*Current Relay*—Any relay which functions at a pre-determined value of the current. These may be either over-current relays or under-current relays.

*Voltage Relay*—Any relay which functions at a pre-determined value of the voltage. These may be either over-voltage relays or under-voltage relays.

*Watt Relay*—Any relay which functions at a predetermined value of the watts. These may be either over-watt relays or under-watt relays.

*Frequency Relay.*—Any relay which functions at a predetermined value of the frequency. These may be either over-frequency relays or under-frequency relays.

*Temperature Relay*—Any relay which functions at a predetermined temperature in the apparatus protected.

*Open-Phase Relay.*—Any relay which functions by reason of the opening of one phase of a polyphase circuit.

*Differential Relay*—Any relay which functions by reason of the difference between two quantities such as current or voltage, etc.

Note.—This term includes relays heretofore known as "ratio balance relays," "biased" and "percentage differential relays."

*Locking Relay.*—Any relay which renders some other relay or other device inoperative under predetermined values of current or voltage, etc.

*Trip-Free Relay.*—Any relay which prevents holding in an electrically operated device such as a circuit-breaker while an abnormal condition exists on the circuit.

*Auxiliary Relay.*—Any relay which assists another relay in the performance of its function and which operates in response to the opening or closing of its operating circuit.

*Signal Relay.*—An auxiliary relay which operates an audible or a visible signal.

QUALIFYING TERMS AS APPLIED TO RELAYS.

*Notching*—A qualifying term applied to any relay indicating that a number of separate impulses are required to complete operation.

*Inverse Time.*—A qualifying term applied to any relay indicating that there is purposely introduced a delayed action, which delay decreases as the operating force increases.

*Definite Time.*—A qualifying term applied to any relay indicating that there is purposely introduced a delay action, which delay remains substantially constant regardless of the magnitude of the operating force. (For forces slightly above the minimum operating value the delay may be inverse.)

*Instantaneous.*—A qualifying term applied to any relay indicating that no delayed action is purposely introduced.

Where relays operate in response to changes in more than one condition, all functions should be mentioned.

## New Book on Radio Telegraphy.

"Principles of Radio Telegraphy," is the name of a new book by C. M. Jansky, which covers the latest practice in radio engineering. The book contains 237 pages and has 179 illustrations.

The first four chapters deal with elementary electrical engineering as applied to radio work, and the remaining seven chapters go thoroughly into the subjects of electromagnetic waves, alternating currents, oscillatory circuits, radio circuits, practical transmitting appliances and methods, practical receiving appliances and methods, and vacuum tubes and their use in wireless telegraphy.

We recommend this fine work to all who are studying or who intend taking up the study of radio signaling.

The price of the book is $2.00 and copies may be purchased from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

**The Teletype**—Coming soon—Watch for it.

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# QUESTIONS AND ANSWERS

### Transmitters.

G. E. D.—Some operators regard the single-contact semi-automatic tansmitter as the best instrument made; but others claim they can do just as good work with the double-contact instrument. So far as the carrying qualities of the signals are concerned, one type seems to be as good as the other when manipulated by operators who use good judgment in regulating the speed of the dots, and who try at all times closely to imitate good hand sending. To regulate the speed of the transmitter so that signals made by it will carry properly over long circuits, and circuits worked through repeaters, adjust the lever weights so that not more than eighteen letters "p" can be distinctly formed in a period of ten seconds.

### Radio Telegraph Positions.

G. A. A.—At the present time there are openings in regular radio service for all of the competent operators and radio engineers who apply. If you have a license, either first or second grade, we can advise you where to apply for a position. If you have no license we can advise you the steps necessary to take to procure one.

### The United Press.

G. L. F.—The United Press Association is incorporated in New York and has general offices in the World building. The president of the Association is Roy. W. Howard; W. W. Hawkins, first vice-president; J. C. Harper, second vice-president; L. V. Ashbaugh, third vice-president; C. S. Jackson, fourth vice-president; C. D. Lee, secretary, and C. F. Mosher, treasurer.

### Earth Currents.

Inquirer: Your letter has been mislaid. We are, therefore, unable to state your initials at the beginning of this answer. As we remember your inquiry, what you are seeking is information relative to data on earth currents. The charts you have seen are very likely the printed sheets showing variations in the magnetic forces as observed at various points on the earth's surface. These forces vary in strength, and sometimes in polarity at different seasons of the year. The actual flow of current differs widely in various parts of the world. The greatest flow is observed in territories where ground return trolley railroad systems are in service. In any given case there are simple means for measuring the strength of the earth potentials at a given time. Standard handbooks on telegraph practice include simple formulae for calculating strengths of earth currents.

### Phonograph Morse Records.

W. W. C.—Morse records of the disk type now available include a set of eight records, each side of each record containing from forty to eighty words in Morse characters. By regulating the speed of the phonograph the speed of the Morse reproduction may be varied from ten to fifty words per minute. The reproduction is clear and is loud enough to be heard fifty feet away from the phonograph. TELEGRAPH AND TELEPHONE AGE has these records for sale.

### Storage Battery.

M. M. F.—The discharge voltage of one cell of storage battery is two volts approximately. To find the total voltage on discharge, or load, of a bank of storage cells, multiply by two the number of cells connected in series. The current capacity, or ampere hour capacity of a cell depends upon the size of the plates and the number of plates in each cell.

### Sounder Current.

A. I. L.—A four ohm sounder requires about one half ampere of current for satisfactory operation; a ten ohm sounder about one-quarter ampere, and a 150 ohm sounder about one tenth of an ampere. To operate twenty four-ohm sounders from one motor-generator, the generator should have a voltage of eight or ten volts and a current capacity of ten amperes or more. If the generator has a higher voltage than that stated non-inductive resistance coils should be inserted in series with each sounder; the resistance of the coils to be of such value that the current in each sounder circuit will be one-half ampere.

### Telephone Engineering.

George W.—The New York-San Francisco telephone circuit is approximately 3,400 miles in length, and is made up of two wires, each weighing 435 pounds per mile. Loading coils are spaced along the line about eight miles apart; or about 425 loading units in all. Due to the employment of these coils and to the insertion of amplifying repeaters at proper intervals along the line, about one-eightieth of the transmitted energy is received at the distant end of the line. Telephone transmission requirements for satisfactory commercial service necessitate that at least one one-hundredth of the transmitted energy be delivered at the distant end of the circuit.

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# Electro-Physics for the Telegraph, Telephone and Radio Student

No. 11.

FACTORS OF THE ELECTRIC CIRCUIT.

The time taken for electrical action to progress along a wire forms a subject which many students have dispaired of mastering. Physicists and laboratory engineers generally are familiar with higher mathematics and are able quickly to calculate current and voltage conditions in a circuit at a given instant under any circumstances. In radio engineering it is necessary to be able to determine instantaneous values if one is to qualify for advanced work. But, while in the past a knowledge of differential calculus, trigonometry and vector analysis has been essential, the present tendency is for engineers to devise simple formulas which may be used by operating men whose knowledge of advanced mathematics is limited, and by means of which all necessary determinations may be made.

In land line telegraph work, submarine cable work and in telephony, although a large number of technical men have been engaged in designing and operating the electrical devices used, only a relatively few engineers, generally stationed at headquarters, are mathematicians. It is very likely that from now forward men engaged in technical work will be expected to familiarize themselves with mathematical operations. There is, of course, nothing in this situation to make anyone at present employed uncomfortable. A little study will help wonderfully. Constant study and concentration will bring to any man the knowledge necessary to solve any problem that may come up in everyday practice.

Now, let us look into the matter of "time" as applied to electrical circuits, and see how far we can get without using calculation beyond ordinary algebra.

An experiment that any telegraph man may perform, which will convince him that appreciable time may be taken for an electrical impulse to travel through a circuit, may be arranged as follows:

Procure a pasteboard tube about an inch in diameter and twelve inches long. Wind on it in layers about 100 feet of insulated wire, any size smaller than 16 gage, bringing the two ends out where connection may readily be made. Now, make up a bundle of iron wires (stove-pipe wire from a hardware store is excellent) cutting the wire into lengths of 12 inches, and by means of a binder-wire on each end tie the bundle so that there are enough wires to have an overall diameter of about three-fourths of an inch, or of such diameter that the bundle will slide easily into the pasteboard tube.

Connect the winding on the tube in series with a telegraph sounder, a vibroplex transmitter, and a sufficient number of cells of battery to operate the sounder satisfactorily when the transmitter is adjusted to send dots at its highest speed.

It will be found now that when the iron wire core is inserted in the tube and the transmitter operated the sounder will work erratically. The five dots of a letter "p" may register as a single dash. The effect observed signifies that the five separate impulses which left the transmitter did not separately get all the way through the circuit. The presence of the iron core choked the impulses; caused them to lag, or in other words each dot did not have time to reach the sounder and register as a single impulse. If, now the transmitter is replaced by an ordinary hand key and the signals formed very slowly the sounder will register each dot. In this case, the signals being transmitted slowly, each dot has time to get through the winding on the tube and affect the sounder before the following dot, to use a simile, piles up on it.


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This experiment illustrates the necessity for adjusting semi-automatic transmitters so that when they are used on long lines each impulse will be separate and distinct and have time to reach the other end of the line before succeeding impulses have a chance to follow too closely.

TIME-CONSTANT.

When a constant electromotive force such as that from a primary battery or a direct current generator is impressed upon a circuit including a magnet coil, or inductance coil such as that of the pasteboard tube type described, the current flowing in the circuit does not reach its full value instantly, as, at first it is opposed by the counter electromotive force due to inductance. The counter electromotive force gradually becomes less as the current strength in the circuit reaches full value. In practice it is usual to regard the operating requirements as such that a value of 63.2 per cent. of the full strength of the current shall obtain in an efficiently operated circuit. The period of time required to attain this value is called the time-constant of the circuit.

$$\text{Time-constant (in seconds)} = \frac{\text{Inductance (in henries)}}{\text{Resistance (in ohms)}}$$

or

$$= \frac{\text{henries} \times \text{final amperes}}{\text{applied volts}}$$

As usually submitted the first formula is given as

$$\text{Time-Constant} = \frac{L}{R}$$

Suppose, for example that it is desired to determine the time-constant of a telegraph relay having a resistance of 300 ohms and an inductance of 2.65 henries. For L we have a value of 2.65 and for R a value of 300, and

$$\frac{2.65}{300} = 0.009,$$

or a time-constant of 0.009 second.

Assume a circuit including an instrument whose electromagnet has a resistance of 600 ohms and an inductance of 6 henries; then, with an electromotive force of 40 volts applied to the circuit the time-constant will be

$$\frac{6}{600} = 0.01 \text{ second.}$$

By means of the Ohm's Law formula

$$I = \frac{E}{R}, \text{ the final current}$$

strength in the circuit may be shown to be

$$\frac{40}{600} = 0.066 \text{ ampere,}$$

therefore in 0.01 second the current strength in the circuit will have reached a value of 0.041 ampere, or 0.632 of its full strength.

## SHOP TALK.

### Everything in Its Place.

BY THE OBSERVER.

There is an old saying to the effect that there should be "a place for everything, and everything in its place." If everyone would follow this idea wouldn't the world be a nice orderly place?

The Western Union Telegraph Company's engineers some time ago provided a tool kit containing all of the necessary tools for handling testing and regulating work. In some instances these little kits had hardly been placed in service when the trays were removed and the tools dumped in a heap. Attendants who have been guilty of this sort of action could not possibly imagine that they were contributing to orderly arrangement or labor saving.

When the trays have been removed and a kit falls to the floor, time is lost gathering up the scattered tools, while had the trays been left in place as the engineers intended they should be, it is necessary only to pick up the case. When the trays are used there is little danger of the tools dropping out, and yet each tool is in plain view when needed and may be selected without delay.

Not enough attendants realize the value of tools, and whenever you observe an attendant who fails to take care of the tools and to keep them in their proper place, you may know you have discovered a violator of orderly arrangement.

The tool kits were provided for all of the testing and regulating men, and the larger tools are in the care of the head of the testing and regulating department and are kept in a tool chest. That is, they should be kept in a tool chest or in some place designated for the purpose. Too frequently these tools are not returned to the place where they are supposed to be deposited. Diagonals, or side-cutters are left under tables, or on operating tables; the user neglecting to return them to the box. It may happen that all of us are at some time or another guilty of this dereliction, but the ill effects of one man's neglect in this respect may be palliated by each of us keeping an eye upon mislaid tools, returning them to their places, even if another man is the guilty person. Mutual help is self help. Suppose, for instance, that you were passing through another testing and regulating man's section and noticed a pole-changer arcing, causing a short circuit to the lamps! Would you feel that you were doing the right thing in passing along unconcerned? Certainly you would not. You would at once apply the remedy. The same view should be held in regard to the tools which are in the joint care of all men in the department.

Keep everything in order; for, "Order is Heaven's first Law."

THE ELECTROLYTIC RECTIFIER had its beginning when Buff, in the year 1856, discovered that if an aluminum rod is employed as one electrode in a saline electrolyte, current will pass through the electrolyte in one direction and not in the opposite direction.

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## THE OLD TIME TELEGRAPHERS AND HISTORICAL ASSOCIATION AND THE SOCIETY OF THE UNITED STATES MILITARY TELEGRAPH CORPS ANNUAL CONVENTION.

The annual reunion of the Old Time Telegraphers and Historical Association and of the Society of the United States Military Telegraph Corps will be held at the Hotel Winton, Cleveland, Ohio, on September 10, 11 and 12. As there have been no reunions of the Association since the gathering in New York City in September, 1916, it is expected that the Cleveland meeting will be unusually well attended. The president of the Association is Mr. W. H. Canniff, who extends to every member a cordial invitation to go to the Forest City for the three days mentioned, lay aside business cares and enjoy the three days that will be given over to the meeting that ought to appeal to every old timer who wishes to mingle personally with wire companions and associates of former days. President Canniff will be ably assisted by numerous committees in carrying out the program of making everyone who is fortunate enough to be present feel that Cleveland's reception far exceeded his expectations.

The other officers and committeemen of the Old Time Telegraphers and Historical Association are: Vice-Presidents, T. W. Hill, B. J. Ross, Cleveland, and F. W. Sprong, Cincinnati; Executive Committee, George M. Myers, Kansas City, H. J. Kinnucan, Detroit, Hon. William S. Jordan, Jacksonville, Fla., W. D. B. Alexander, C. D. Johns, H. P. McIntosh, D. C. Moon and W. R. Woodford, Cleveland; Secretary and Treasurer, John B. Taltavall, 253 Broadway, New York.

Local Cleveland Committees: General Committee, W. R. Woodford, Chairman, Rockefeller Building; Committee on Finance, T. W. Hill, Chairman, Guardian Savings and Trust Company; Committee on Entertainment, W. R. Woodford, Chairman; Committee on Hotels, B. J. Ross, Chairman, Western Union Telegraph Company; Committee on Registration, Isaac Morris, Chairman, 732 Leader-News Building; Committee on Press and Printing B. J. Ross, Chairman; Committee on Badges, H. E. Patton, Chairman, Postal Telegraph-Cable Company; Reception Committee, W. H. Canniff, Chairman; Ladies' Reception Committee, Mrs. W. H. Canniff, Chairman.

The officers of the United States Military Telegraph Corps, which will meet in conjunction with the Old Time Telegraphers, are:—Vice-Presidents, Richard O'Brien, Scranton, Pa., Wm. L. Ives, New York and Arthur L. Tinker, Stamford, Conn., Secretary and Treasurer, David Homer Bates, 658 Broadway, New York; Executive Committee, Col. Robert C. Clowry, Col., Albert B. Chandler, Henry Waycott Dealy, New York, Wm. R. Plum, Lombard, Ill., J. Clendenin Eckert, Stamford, Conn., Albert W. Orton, Jr., Rome, N. Y., John Wintrup, Philadelphia, Charles Patterson Bruch, New York, Francis S. Wilson, Jersey City, N. J.; Historian, Wm. R. Plum, Lombard, Ill. Owing to the death of Colonel William Bender Wilson, Philadelphia, who was president of the Association for twenty-two years, it was thought inadvisable to fill the vacancy until the annual reunion at Cleveland.

The Hotel Winton has been selected as headquarters, and so far as possible it is recommended to the out-of-town visitors that they make this hotel their stopping place. It is centrally located, on Prospect Avenue near East Ninth Street, is a new hotel and the management of the Winton can be relied upon to put forth every effort to make their guests fully satisfied, and make the reunion a successful one.

The prices of rooms are:

Single rooms, $2.00 to $2.50 per day, per person.

Double rooms, $3.00 to $3.50 per day, for two persons.

All rooms have shower baths. Rooms with tub baths, 50 cents to $1.50 per day additional.

During Government control of railroads it will be impossible to secure any transportation concessions. Therefore, it will be necessary for each member to make his or her own traveling arrangements.

D. H. Fitch, who is now 82 years of age, an old time telegrapher living at Cazenovia, N. Y., has presented to the Old Time Telegraphers and Historical Association a Siemens Universal Galvanometer which was given him by the employees of the St. Louis, Kansas City and Northern Railroad at Moberly, Mo., on his retirement as superintendent of telegraph from that service in the seventies. Mr. Fitch also presented to the Association a pocket relay used by him as a military telegrapher during the Civil War. It is in an excellent state of preservation. It has considerable historical value attached to it. When the Grand Duke Alexis of Russia and his suite, consisting of the Chief Justice of Russia, the Admiral of the Navy, and other high officials made the tour of the United States, many years ago the St. Louis, Kansas City and Northern Railroad, of which D. H. Fitch was superintendent of telegraph, was a part of the route over which the party traveled. Mr. Fitch took with him the pocket relay on this famous train which was made up of the best railroad equipment in the country at the time. On the train were other officials of the railroad together with an expert lineman, and during its progress over the road there was a constant stream of telegrams to and from the Emperor of Russia, received and sent from many way stations. No account was made of the messages received and sent from the various offices, the record being kept in New York. The Grand Duke wished a demonstration how messages could be sent from any point along the line outside of an office. The train was stopped between stations and the necessary connections were made with the pocket relay just presented to the Old Timers' Association, and a message was forwarded from the Chief Justice to the Emperor at St. Petersburg, now Petrograd, asking permission to accept the invitation of General Sheridan to go on a buffalo hunt. The Grand

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Duke was surprised to witness this accomplishment at such a place and under such conditions and he kept the instrument in his hand for the remainder of the trip, turning it back to Mr. Fitch at the end of the journey.

Mrs. Minnie Swan Mitchell, wife of the late John Mitchell, well known in newspaper and telegraph circles in New York for many years, and leader of the telegraph strike in New York City in 1883, has presented to the Association the whistle that was blown in the general operating department of the Western Union Telegraph Company at 195 Broadway, New York, which inaugurated the telegraphers' strike which lasted just 30 days. The whistle was blown at 12 noon, July 19, 1883, by Frank R. Phillips, a telegrapher. The operators at the various wires transmitted a signal over their respective circuits which meant that the strike had taken place and then left the operating room in a body. It will be interesting to note that Mr. Phillips is now a business man of Montreal. John Mitchell, who was known as the master workman of the New York Local Assembly, died in 1908. Mrs. Mitchell who donated the whistle came into possession of it through her husband many years ago and thinks it possesses sufficient historical value to make it an interesting acquisition to the archives of the Association. The whistle is of a bull dog pattern, has a band of gold around it bearing the inscription mentioned previously. Mrs. Mitchell herself is an old time telegrapher. In the early eighties she was private operator for the late Robert Garrett, president of the Baltimore and Ohio Railroad Company. She has also filled many other important telegraph positions.

No doubt many other members of the association have articles of historic value that they would be glad to place where they will be duly inscribed, recorded and appreciated. To those possessing whatever they deem historically valuable from a telegraph standpoint, we would suggest that they consider the Old Time Telegraphers and Historical Association the proper custodian of all such material and records.

### "Mathematics for Engineers."

"Mathematics for Engineers" is the title of a work by W. N. Rose, which embraces all of the mathematics needed by engineers in practice and by students in all branches of engineering science. The work is in two volumes; the first carrying the studies through algebra, plane trigonometry, mensuration and graphs, the work being carefully graded from an elementary to an advanced stage. The second volume is devoted to the calculus and its applications, harmonics and vector analysis, spherical trigonometry, etc. Volume I. contains 507 pages and is an excellent book for the telegraph and telephone engineer or student to possess, as the treatment of the subject of mathematics here worked out is from the engineer's standpoint.

The price of each volume is $5.00 and copies may be procured from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.


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VACUUM TUBES IN WIRELESS COMMUNICATION. By E. E. Bucher. Pages (6x9 inches) 174; illustrated. New York, August, 1918.

Mr. Bucher, who is instructing engineer, Marconi Wireless Telegraph Company of America, in the present work presents a volume which shows over one hundred different circuits for the practical use of vacuum tubes as detectors, radio or audio frequency amplifiers, regenerative receivers, beat receivers and generators of radio frequency currents.

A series of graphic charts in the appendix explains the functioning of the vacuum tube in an elementary manner. The technical introduction reviews the problems of continuous and discontinuous wave transmitters and receivers.

The book is ably written and the illustrations are clear and understandable. Telegraph students and engineers will find written in its pages a great amount of radio information along lines that are certain to be of importance in the operation of radio systems of the present as well as the future.

The price of this book is $1.75 and copies may be obtained by making remittances payable to John B. Taltavall, publisher, TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

IN THE YEAR 1814, the London *Times* was first printed by machinery.

GAS LIGHTING was introduced in the city of Baltimore in the year 1816.

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## OBITUARY.

### Death of Mr. Carnegie.

Andrew Carnegie died at Lenox, Mass., at 7:50 o'clock, on the morning of August 11. Mr. Carnegie was stricken late in the afternoon of August 10 with bronchial pneumonia. At the time of his death, Mr. Carnegie was attended by his wife and his secretary, John A. Boynton; his daughter, Mrs. Roswell Miller, who lives at Millbank, N. Y., was notified of her father's illness, but did not arrive until after he had died.

Andrew Carnegie started life as a telegraph messenger, and from 1855 until 1865, worked for the Pennsylvania Railroad in the operating department. Early cautious financial ventures brought him large returns, and by the year 1874 he had become one of the masters of the steel business. His rapid rise as a financier is common knowledge, and his many philanthropic undertakings brought to him international fame as a benefactor of mankind.

Mr. Carnegie during his entire life has been a true friend of telegraphers, especially those with whom he was associated during the Civil War. For years he has maintained a pension roll for members of the United States Military Telegraph Corps, 200 of whom still survive. He took a particular interest in fast sending telegraph tournaments, and as a patron of these periodical events contributed valuable prizes. The Carnegie diamond medal has been a coveted trophy at the last four national telegraph tournaments, the present holder of the medal being Thomas S Brickhouse of Los Angeles, Cal.

### Death of Albert C. Farrand.

Albert C. Farrand, identified with fire alarm telegraph interests for over thirty years, committed suicide at Ventnor City, N. J., by shooting himself in the head, on August 5. Mr. Farrand was a well known and highly respected member of the Municipal Electricians. He was born in Oshkosh, Wis., on April 24, 1861, where he became identified with the fire alarm telegraph system of that city, and early in life showed much aptitude for that special calling, in the details of the system of which he became expert. In 1887, he built and equipped the fire alarm telegraph system at Atlantic City, N. J. In 1892, he accepted a position with the Gamewell Fire Alarm Telegraph Company of New York, with which interests he remained until 1898, when he was elected city electrician at Atlantic City, N. J.

Mr. Farrand was elected president of the International Association of Municipal Electricians, in 1903, and the manner in which he administered the affairs of the association endeared him to his fellow members.

HERBERT C. RICHARDSON, age sixty years, a former well known New York telegrapher but for over thirty years, identified with the electric light industry, died at his home in Metuchen, N. J., on July 23. Mr. Richardson came to New York from Canada in 1878 and was employed in the main office of the Western Union Telegraph Company at 195 Broadway, where he remained for ten years when he cast his lot with the electric light development. Mr. Richardson established many of the electric light plants in central New Jersey and formed what was known as the Central Electric Company which controlled many of the plants until they were absorbed by the Public Service Corporation. Fifteen years ago, Mr. Richardson met with an accident which brought about the paralysis of the locomotor nerve centres from which he had suffered ever since. He was highly respected by the fraternity, having kept in touch with the older members through his membership in the various fraternal and social organizations and clubs. He is survived by his wife.

WILL F. ARCHBALD, aged eighty-one years, the telegrapher who transmitted the first message across the Atlantic cable, died at Nanaimo, B. C., July 25. The message which opened trans-Atlantic cable service was addressed by the late Queen Victoria of Great Britain to President Buchanan, at Washington.

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# Telegraph and Telephone Age

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No. 17 NEW YORK, SEPTEMBER 1, 1919. Thirty-seventh Year

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### "Operators Wanted."

Back in the days of the waiting list, and the "block," when telegraph traffic was at a low ebb and, in number, good Morse operators exceeded the demand, two telegraphers from up-state arrived in New York in search of employment. After making the rounds of the commercial telegraph offices and railroad headquarters in a futile attempt to find positions, the boys turned their attention to the advertising columns of the metropolitan dailies to see if they could not find work that would tide them over until the wires again began to hum.

There were want advertisements for bakers and butchers and barbers, and an occasional one for a bartender or a bricklayer, but no one seemed to need a couple of all 'round handy men. However, as the two telegraphers were going up town on an elevated train one of them spied a cardboard sign hanging from a second story window, reading "Operators Wanted." Immediately,—precipitately, he grasped his friend's arm and the two bo ted for the car door and the guard had to use menacing persuasion to induce the boys to wait until the next station was reached before alighting.

In a few minutes they reached the building from a window of which dangled the promising card. Later as they were descending the stairs each gave the other an "I told you so" look, as a result of their discovery that to meet the requirements of an "operator" in that establishment it was necessary to be able to baste and press, and sew on buttons.

It is a peculiarity of the telegraph business that rarely has it been necessary to broadcast the legend, "Operators Wanted." To-day, however, manipulators of the telegraph key are in such demand that advertisements are appearing announcing positions for all who apply and meet the requirements.

In the August 16 issue of TELEGRAPH AND TELEPHONE AGE appeared two advertisements, reading: "Operators Wanted," one for Morse telegraphers and one for radio operators. Thus for the first time in many years telegraphers are enjoying the unique experience of shopping through the periodicals for positions and for pay.

The old art still lives and those who practice it have presented to them new opportunities.

### The Telegraph Profession.

One of the speakers at the banquet held in connection with the meeting of the Telegraph and Telephone Division of the American Railroad Association at Chicago in June last, was H. Hulatt, manager of telegraphs, Grand Trunk Railway System and Grand Trunk Pacific Railway, and now second vice-chairman of the Division. His subject was "Development of the Telegraph and Telephone Division," and his remarks, particularly those dealing with the need for more advanced technical education, were so pertinent that TELEGRAPH AND TELEPHONE AGE has persuaded Mr. Hulatt to contribute two articles on the subject of his talk at Chicago. The first of these articles appears elsewhere in this issue. His conclusions point plainly to the fact that personal progress is no longer possible for the telegraph man who neglects to improve his knowledge of the technical side of the business

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# CURRENT EVENTS

## EXECUTIVE OFFICE ANNOUNCEMENTS, PERSONAL MENTION, APPOINTMENTS

### PERSONAL.

#### Sir Charles Bright.

Among those who received the honor of Knighthood on the occasion of King George's birthday on June 3, this year, was Charles Bright of London. Mr. Bright, now Sir Charles Bright, was born in the year 1863, and is a son of Sir Charles Tilson Bright who rendered distinguished service in connection with the laying of the trans-Atlantic cable of 1858.

The present Sir Charles Bright is a Fellow of the Royal Society, Member of the Institute of Civil Engineers, Member of the Institute of Electrical Engineers, and consulting engineer for the commonwealth of Australia.

He has been professionally engaged on a number of cable laying expeditions in various parts of the world, and also in the construction of some 25,000 miles of cable and land telegraphs. In the year 1897 he made a report for the Colonial Office on the Pacific cable scheme, and gave evidence to the House of Commons radio telegraph committee in 1907. In 1912 he represented the Australian Commonwealth at the radio telegraph conference. In 1916 he was a member of the Flying Corps inquiry committee and of the British Association war and engineering committee, and of several other patriotic and engineering undertakings.

Sir Charles is the author of several works on the subjects of submarine cables and radio telegraphy.

KENT COOPER, general traffic manager of the Associated Press, has returned from Europe where he has been for several weeks checking up news transmission facilities between Europe and America.

THOMAS S. BRICKHOUSE, winner of the Carnegie diamond medal at the National Fast Sending Telegraph Tournament, held in San Francisco, Cal., in 1915, is now employed as chief operator in the service of E. F. Hutton & Co., Brokers, 61 Broadway, New York. Mr. Brickhouse is bringing his family to New York and intends to remain in the metropolis permanently.

D. P. HEALY, attached to the engineers' branch, telegraphs and telephones, Postmaster General's Department, Melbourne, Australia, was a New York visitor on August 11. Mr. Healy has been in military service in France and is now on his way home.

### WESTERN UNION TELEGRAPH COMPANY.

THOMAS W. CARROLL, general manager, New York, has returned from an inspection trip to offices in Connecticut, Massachusetts and Maine.

F. E. d'HUMY, central office engineer, and S. R. Crowder, equipment layout engineer, New York, are on an inspection trip which will take them to all of the large offices in the South, the West, and on the Pacific coast.

S. B. HAIG, division traffic superintendent, is on his annual vacation, which he is spending at points in New Jersey.

O. J. NOURSE, of Vice-President Fashaugh's department, is spending his vacation in Canada.

C. W. FREY, of the division traffic department, New York, has gone to St. Louis, Mo., for a short visit.

C. J. WALBRAN, has returned from military service overseas and resumed his position as automatic studies engineer in the traffic department, New York.

H. J. HUGHES, engineering assistant, traffic department, is on his vacation.

HOBART MASON, plant layout and routing engineer, traffic department, is spending his vacation at a Jersey coast resort.

PHILO HOLCOMB, jr., formerly of the division plant office, Atlanta, Ga., and who has been overseas in military service, has returned home and is now a member of the traffic department staff at Atlanta. While stationed in the occupied zone in Germany Mr. Holcomb was chief operator of the Coblenz telegraph office.

EMMETT R. SHUTE, engineer, division traffic superintendent's office, New York, is spending his vacation in the country.

KENNETH F. RICE, during the past year district commercial manager at Syracuse, N. Y., has been transferred to Buffalo, N. Y., in the same capacity.

CAPTAIN R. W. HALL, Signal Corps, who went overseas as a Lieutenant in the Erie unit, has returned home and resumed his position as a member

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of General Manager T. W. Carroll's staff. Captain Hall brought back as souvenirs from the war zone several German field telegraph and telephone sets.

W. A. SAWYER, district commercial superintendent, New York, has returned from his vacation which he spent at a resort on Lake Erie.

GEORGE SULLIVAN, who has been overseas in military service, has returned to New York and resumed his position in the general manager's department.

GEORGE M. FOOTE, until August 1, manager at Washington, D. C., for the Postal Telegraph-Cable Company, has been appointed manager for the Western Union Telegraph Company at Washington, vice W. R. Williams transferred to New York.

E. WALDRON of the Atlanta, Ga., office of this company, was a New York City visitor on August 20, en route home from Maine.

J. N. BOICE, manager at Newport News, Va., has been transferred to the managership at Norfolk, Va., and has been succeeded as manager at Newport News by T. A. Worthington, who on a previous occasion and for a number of years occupied that position. Upon leaving Newport News Mr. Boice was presented by the staff with a set of silverware.

H. E. WHITE, supervisor at Norfolk, Va., for the Western Union Telegraph Company, accompanied by his wife, spent a week in New York beginning August 14.

AT DES MOINES, IA., a meeting was held August 8, attended by about fifty Western Union managers from offices in that territory. The purpose of the gathering was to discuss ways and means of improving the service and of increasing the volume of traffic.

## New York Western Union.

Upon announcement recently by the company that the "average slip" had been abolished, retroactive wage increases granted, pre-war time-and-a-half rating for Sunday work, and a 10 per cent. bonus to employees granted, Deputy President L. P. Tebeau, of the Association of Western Union Employees issued a circular to the members of the Association calling upon them to show their appreciation of these benefits by increasing the efficiency of operation, to the end that the company may receive returns which will justify their action, and that the telegraph service to the public will be improved.

J. A. McLaughlin, chairman of the Buffalo, N. Y., local of the Association, issued a similar appeal to members in his territory, as have the chairmen of many other locals throughout the country.

This sort of cooperation between company and employees is bound to produce results which will reflect a satisfied staff and more efficient operation of the telegraph facilities.

## New York Messenger Boys' Outing.

The outing of the Western Union messenger boys, which was held on August 17, at Munger's Beach, New Dorp, Staten Island, was an event looked forward to during many weeks by five hundred athletic youngsters who have been working into form for the sporting contests.

When the day of the Big Meet arrived New-York was in the throes of a subway and elevated railroad strike, and in the forenoon rain fell in torrents. To older folks with "rheumatics" and such disabilities the prospects for a successful athletic meet might have seemed hopeless. Not so to the hundreds of youthful telegram runners.

The five hundred messengers who attended the meet gathered at the Battery and were taken by special boat to Staten Island, thence to the beach by special train and buses.

As was perfectly proper and in line with each youngster's ideas, the day started off with a clam chowder feed. At 1:30 p. m., the starter's pistol announced the commencement of the games, the results of which are given herewith. After the sporting events were concluded everyone checked in at the banquet hall to attack a shore dinner which in quantity and quality met with unqualified endorsement without a dissenting voice.

After the banquet a vaudeville entertainment was carried on, the performers all being messenger boys, and the music supplied by the Western Union orchestra. The crowning event was the awarding of the gold, silver, and bronze medals won in the field during the afternoon by the victors in the games.

The sports officials were: Captain Charles S. Dieges, N. Y. A. C., referee; R. J. Murphy, assistant referee; Charles V. Clare, starter; R. F. Murphy, R. B. Hubbs, L. Scatterstein, R. H. Carey and H. Garvey, judges; J. P. Donovan, timer; N. W. Jacobs, clerk of course; P. J. Sullivan, D. Drew and M. J. Lyons, inspectors; W. H. J. Euston, announcer; E. Kohl, M. Green, A. Nadel and Harry Weidler, scorers.

The second District, C. B. McCann, district commerical superintendent, won the track meet with a score of fifty-one points, which brought to the team from that district permanent possession of the much prized championship banner.

The Summaries.

60-yard dash (junior)—won by C. Friedman, 32 Nassau St. office; J. Liepsitz, 16 Broad St. office, second; N. Sheridan, 382 East 149 St. office, third. Time 0:07 1-5.

100-yard dash (senior)—won by H. Mostow, 1775 Broadway office, first; L. Kroll, 270 West 23 St. office, second; H. Silver, 1450 Broadway, office, third. Time 0:12.

100-yard dash (junior)—won by S. Vogel, Flatiron Building office; H. Greenberg, 195 Broadway office, second; R. Snyder, 8 Martense St. office, Brooklyn. Time 0:13.

2080-yard relay (senior)—won by Second District H. Mostow, J. Schreiber, L. Kroll, N. Jurkowitz.

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Third District H. Sheridan, A. Liedtke, C. Hoffman, W. Christy, second; Third District S. Klein, W. Scherzinger, J. Ryan, G. Garvin, third.

880-yard relay (junior)—won by Second District, C. Bowlby, S. Vogel, S. Fern, N. Sobel. Fourth District, J. Piesback, F. Scarratta, L. Larkowitz, J. Snyder, second; First District L. Wolper, J. Rosenthal, B. Benison, I. Kroshinsky, third. Time 2:36 3-5.

520-yard run (senior)—won by M. Jurkowitz, Flatiron Building office; W. Christy, 382 East 149 St. office, second; P. Bricker, 195 Broadway office, third. Time 1:19.

Running broad jump (junior)—won by A. Greenfield, 11 Broadway office; B. Krantor, 1450 Broadway office, second; H. Epstein, 12 West 31 St. office; distance 14:8 feet.

Running broad jump (senior)—won by S. Katz, 1450 Broadway office; B. Fox, Flatiron Building office; W. Christy, 382 East 149 St. office, third; distance 14 feet.

Running high jump (junior)—won by M. Abramowitz, 9 Pine St. office; H. Sobel, Flatiron Building office, second; Jack Liepsitz, 16 Broad St. office, third; height 4 feet.

Running high jump (senior)—won by David Gettinger, 16 Broad St. office; Louis Sknolnack 203 East 14 St. office, second; M. Jurkowitz, Flatiron Building office, third; height 4 ft. 1 in.

Novelty race (junior)—won by Irving Kroshinsky, 17 Battery Place office; John Diorio, 100 William St. office, second; Max Walkes, 195 Broadway office, third.

Novelty race (senior)—won by F. Scarratta, 412 Jackson Ave. office; I. Burman, 195 Broadway office, second; L. Larkowitz, 16 Broad St. office third.

Point score:—Second District 51, First District 47, Third District 12, Fourth District 10.

During the entertainment which closed the meeting J. F. Nathan, commercial general superintendent, Western Union Telegraph Company and Captain Charles S. Dieges, of the New York Athletic Club, delivered addresses to the boys, which were listened to with evident interest and attention.

## Telegraph Tariffs.

With the return of the telegraph systems to their owners August 1, the Postal Telegraph-Cable Company restored day, and night message tariffs in effect prior to the taking over of the lines by the Government. On January 1, 1919, the Postmaster General, at that time in control of wire communications, advanced telegraph rates 20 per cent and the Postal Company was required to accept for transmission day lettergrams the same as handled on the lines of the Western Union Telegraph Company.

On August 1, the Postal Company discontinued acceptance of day lettergrams, but continues to accept night lettergrams at the tariff in effect during Government control, excepting intrastate night lettergrams which are being charged for at the rates in effect during Government control.

The Western Union Telegraph Company upon resuming control of its lines left in force the rates established by the Postmaster General; that is, the pre-war rate plus 20 per cent. In a statement issued by the company aiming to justify the increased rates, they say:

"Present rates are necessary to maintain a national service.

"A national service includes provision for 20,000 unprofitable offices, as well as the self-sustaining and profitable offices in 2,500 communities.

"If the Western Union restricted its business to those communities between which service is profitable, some 20,000 places now a part of a national system, would have no telegraph service whatever.

"The necessity for meeting higher costs of wages, material, taxes, and expenses of every kind requires maintenance of the existing schedule of rates.

"Public interest demands that rates shall be charged which will encourage rather than hamper efficiency and excellence of service."

## POSTAL TELEGRAPH-CABLE COMPANY.

EUGENE P. TULLY, of the general manager's department, has returned from a trip to Pittsburg, Pa., and other points in the eastern division.

C. A. COMSTOCK, of the general manager's department, is visiting offices in the Southern Division, accompanied by G. W. Ribble, general superintendent, Atlanta, Ga.

JOHN F. SKIRROW, associate electrical engineer, visited Chicago and intermediate points recently in connection with new line construction work under way.

ISAAC SMITH, superintendent of tariffs, has returned from his vacation.

MISS CLARA BENZ, stenographer to the general manager, is spending her vacation at Silver Bay, N. Y.

MRS. PORTER, chief clerk in the office of the fourth vice-president, is away on her summer vacation.

THE WORK is under way of making extensive improvements in the operating department of the New York Cotton Exchange office. A modern circuit-concentration switchboard is being installed, additional operator positions are being provided and the pneumatic tube service to other down town offices is being rearranged with a view to speeding up the service.

CHARLES E. STUMP, manager of the Dock Street Wharf office of the Postal Telegraph-Cable Company, Philadelphia, Pa, was a visitor in New York on August 18 en route to Massachusetts where he will spend two weeks, visiting friends.

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H. SCRIVENS, superintendent, Pittsburg, Pa., was a recent visitor at the executive offices.

MANAGERS APPOINTED: W. L. Stotts, Hutchinson, Kan.; G. H. Frame, Fort Smith, Ark.; Philip Daniels, Anaconda, Mont.; Miss D. L. Weber, Palatka, Fla.; Miss L. B. Allen, Santa Barbara, Cal.; and Helen Sparrow, Amesbury, Mass.

### Philadelphia Postal Notes.

EARL W. MILLER, chief operator, is spending his annual vacation in the country.

GEORGE L. KOHLBRENNER, of Superintendent C. E. Bagley's office, is Philadelphia agent for TELEGRAPH AND TELEPHONE AGE.

E. W. BATCHELOR, formerly city foreman, has been placed in charge of the underground cable department, with H. B. Price as assistant. Mr. Batchelor succeeds Joseph M. Eder, who died a few weeks ago.

MEMBERS of the Philadelphia staff who are now away or who are just returning from vacations, include C. A. Currier, quadruplex chief; P. J. Reilly, monitor chief; F. K. Holtzinger, night chief operator; W. P. Bowers, city traffic chief; John A. McNichol, night chief operator; F. P. Burns, night monitor chief; Margaret Walsh, telephone supervisor; M. J. Bessemer, night wire chief; J. J. Hardy, chief clerk to superintendent; F. P. Hoban, service clerk, and John Shindine, route clerk.

EDWARD ALLEN and James Cheeseman are new members of the Philadelphia plant department. They do their trouble-hunting travelling in an automobile, and have established enviable reputations in accomplishing quick repairs.

MANAGER J. H. WILSON is the busiest man in Philadelphia these days, taking care of the rapidly growing volume of telegraph traffic passing through the Postal's main and branch offices.

A. G. CARPENTER, office electrician, has returned from Harrisburg where he has been for some time installing additional Morse multiplex apparatus in that office.

LEO MILLER, for many years manager of the office in the Grain Exchange, is now attached to the operating department of the main office.

W. J. BURT, who has been employed at Belair, Md., for some time past has been transferred to the main operating department, Philadelphia.

### San Francisco Postal.

The staff at present employed in this office includes the following: George W. Holt, manager; L. J. Miller, assistant manager; R. H. Cornwell, cashier; Maurice O'Neill, chief operator; Don. H. Townsend, night chief operator; G. W. Parsons, all night chief operator; Frank Arnsberger, wire chief; G. C. Woodward, assistant night chief; R. D. Thompson, day traffic chief and C. O. Willette, assistant to the all night chief.

Messrs. Arnsberger and Townsend recently returned from their vacations, which they spent sightseeing around the Bay cities. Mr. Parsons is now on vacation with his family at one of the resorts on the Russian river.

The expert Morse operators now detailed to the First Pacific circuit (New York-San Francisco) are: M. J. Wolinsky, J. M. Furr, C. G. House, Ed. Meyers, F. F. Grogan, and Harry Tompkins. The Second Pacific circuit is manned by George D. Butler, Thomas Coffy, E. R. Zimmerman, Frank W. Seaman, L. G. Le Compte and J. MacDonald. Operators working the First Chicago circuit are: H. Bradbury, Roy L. Nichols, John Ufford, D. L. Hazzard and R. P. Klock. Daniel Biagini and Otto Harleson work the First Seattle circuit; Chris. Hanes, J. O'Neill and Miss Arding, the First Seattle circuit. At the present time the force consists of about seventy-five men and women.

Archie Rainey, for many years employed in this office, now takes the United Press report in Oakland.

Charles W. Leiser, is relieving as night chief operator in the Salt Lake City, Utah, office. Mr. Leiser was the first chief operator of that office when it was opened about fifteen years ago.

A. P. Andrews, is acting manager at Fresno, Calif. Until recently he was manager of a branch office in San Francisco.

## THE CABLE.

CHARLES PRIEST, chief engineer, Commercial Cable Company, New York, has returned from his annual vacation.

WILLIAM FISHER, son of Frank E. Fisher, of the executive offices, Commercial Cable Company, New York, was killed by lightning on August 18. At the time of the fatal occurrence Mr. Fisher was at a camp in Pennsylvania where he was spending his vacation.

D. MACDONALD, of the operating department, Commercial Cable Company, 20 Broad Street, New York, is spending his vacation at Schroon Lake, in the Adirondacks.

### Cable Concession in Uruguay.

By a resolution of June 12, 1919, the Uruguayan Ministry of Industries has authorized the Central & South American Telegraph Co. to bring into Montevideo one or two cables coming from Rio de Janeiro and Santos or from one of these cities. This company was authorized in September, 1918, to extend its telegraph and telephone lines from Buenos Aires to Montevideo.

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## RADIO TELEGRAPHY.

### Marconi Notes.

W. J. HERNAN of the Wireless Press, Ltd., returned on the Steamer *Baltic* from a trip through the war zone.

WILLIAM S. FITZGERALD has been appointed assistant superintendent of the Eastern Division.

C. J. Ross, comptroller, is spending his vacation at the Thousand Islands.

DAVID SARNOFF, commercial manager, has returned from a business trip to Washington.

SECRETARY ENGSET and Chief Engineer Peterson of the Norwegian Telegraph Administration, arrived on the Steamer *Royal George* to inspect the Cape Cod stations of the Marconi Company, which have been equipped for exchange of radio traffic with Norway.

CAPTAIN ARTHUR W. STEEL, of the Canadian Signal Corps, and identified with the intelligence service of the Canadian expeditionary forces in France during the war, has taken up research work at the University of Toronto.

JOHN C. JENSEN, director of the radio laboratories for war training, University of Nebraska, during the year 1918, is now professor of physics at Nebraska Wesleyan University.

ROY J. HEFFNER, who during the war was a Captain in the Signal Corps and in charge of the instructional school, department of military aeronautics, Washington, and later in charge of the radio section at Rockwell Field, San Diego, Cal., is now an instructor at the University of California.

HOWARD E. CAMPBELL, during 1918 officer in charge of the United States naval radio training school at Marshalls, Cal., is now chief naval radio inspector for the port of San Francisco.

WILLIAM E. WOODS, during the war attached to the Belmar, N. J., and Otter Cliffs, Me., radio stations, is now connected with the Manhattan Electrical Supply Co., at St. Louis, Mo.

THE RADIO TRAINING SCHOOL at the Naval Academy, Annapolis, Md., has been closed. The number of trained radio men now being released from Government service is sufficient to meet present Government needs.

A NEW MONTHLY RADIO PERIODICAL, to be known as the *Radio Review*, published in London, England, will make its appearance in October. G. W. O. Howe will be the editor, and P. R. Coursey, assistant editor. The subscription price in the United States and Canada is $7.15 per annum.

MANY WIRE CHIEFS and CHIEF OPERATORS in commercial and railroad telegraph service are sending in their applications for membership in the Institute of Radio Engineers. The value of the published Proceedings of the Institute is worth many times the annual membership fee. Application forms may be procured from Donald McNicol, editor, TELEGRAPH AND TELEPHONE AGE.

ALFRED N. GOLDSMITH, secretary of the Institute of Radio Engineers, and director of research, Marconi Wireless Telegraph Company, New York, is taking advantage of the vacation season to spend two weeks at the seashore.

RADIO ENTHUSIASTS in the vicinity of New York are having considerable practice in making fine adjustments of their apparatus, and incidentally are being agreeably entertained, due to experimentation in radio telephony which is being conducted between various stations and laboratories.

THE OFFICES of the Independent Wireless Telegraph Company, at No. 42 Broadway, New York, during the latter two weeks of August have been the scene of much activity. The large demand for radio operators has stirred many Morse telegraphers to practice up on the Continental code. Several well known Morse men are drilling for the new work. Before long we may expect to receive souvenir postal cards from Singapore and Timbuctoo.

MOST RADIO AMATEURS start out with a crystal receiver outfit, but generally it is not long before they decide that an audion receiver set is necessary to their happiness. The fact that now a first class vacuum tube receiving set complete may be purchased for less than fifty dollars has opened up a new path of pleasure and profit for many ambitious telegraph men.

### Proposed New Wireless Installation for Madeira.

The Portuguese Government is considering purchasing from the British Navy the wireless installation now at Madeira for Porto Santo, and procuring a more powerful apparatus for Madeira. Firms interested should communicate with the Minister of Commerce, Lisbon, Portugal.

### New Radio Call Book.

The Consolidated Radio Call Book, which contains 2,500 calls in addition to those listed in the Berne Bureau's call book of April, 1918, is now ready for distribution. The book will be of great value both to the amateur as well as the professional radio operator. In addition to the complete list of radio ship and shore station calls of all nations the book contains a large amount of information relative to radio traffic handling, rates, etc. Copies may be purchased from TELEGRAPH AND TELEPHONE AGE, at $1.00 per copy.

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### Radio Telegraphy and the Phillips Code.

In a recently published paper on the subject of radio telegraphy, by Robert Boyd Black, the author calls attention to the fact that the use of Phillips Code abbreviations is applicable in the operation of radio telegraph systems.

The possibilities in increased speed of transmission and reception when the system of abbreviations is employed by operators, should be apparent. A method of word and sentence abbreviation, such as is embodied in the Phillips Code, gives to operators an easily acquired and natural means of increasing materially the number of words transmitted in a given time.

It was a misfortune for radio that long experienced land line telegraph managers did not earlier in its development take an active part in the deliberations which brought about radio traffic regulations. It is true that during "United Wireless" days, land line Morse telegraphers were employed as radio operators, and many an old-timer can still in memory hear the musical, rapid American Morse sending of Pickerill at the United Wireless "Wa" office, New York, when the Phillips Code was used to good advantage.

Shortly thereafter "Wireless" came upon evil days; that is, so far as development in this country was concerned. When revival set in, Berlin conventions had become a habit, and delegates selected here for attendance at radio conventions staged in the German capital were not picked because of any knowledge they had of telegraphy; even of radio.

Our delegates brought back the Continental alphabet and the International Code Signals, and forthwith radio and land line telegraphy parted company.

The Conventional signals, of course, were of value where radio operators of different nationalities and languages desired to ask or answer prearranged service questions, but there is no question that had the students who learned radio as amateurs been required to familiarize themselves with the Phillips Code there would have been no occasion for the employment of the International Conventional signals between American operators.

For example, according to the Conventional signals, when an operator desires to know the name or call of a certain station which may be signaling, he says: "QRA." The station questioned responds "QRA WGV", the "WGV" being, in this case, the sender's office call. There are about sixty-five such conventional signals to memorize. In the case cited Phillips Code usage would involve transmitting the understandable signal "Wo," meaning "Who," and the response would consist of the distant office call only.

In quarters where the bulk of the world's telegraphing handled by means of a telegraph alphabet is moved, there is almost unanimous agreement that American radio operators should never have had to learn or use the Continental alphabet—that the American Morse would have answered satisfactorily. Of course, submarine cable people and European telegraph authorities have an opposite opinion. In this connection we know, however, that when our country entered the war many thousands of young men were sent to training schools to learn the Continental alphabet, and although the cost per student to the Government was high, only a small percentage of the students ever saw active service. Had the American Morse alphabet been regarded as sufficient there were one hundred thousand qualified operators already available for service. Too late! Berlin had long ago saddled upon us an alphabet our telegraphers did not understand, and our Army and Navy authorities were committed to the use of that alphabet. No, not entirely too late! When our participation in the war was at its height a sudden call was received from France for a hundred American Morse operators, and in a flash these men were on their way with their vibroplexes under their arms and their Phillips Code book in their pockets.

### Pan-American Telegraph Notes.

BOLIVIA.—Early in May, this year, the radio station erected at Cobija was completed and ready for service. The station was erected by the Marconi Wireless Telegraph Company.

BRAZIL.—Work on the telephone lines between the cities of the coast and the interior is being rapidly carried on, and telephone communication has already been established between Sorocaba and Rio de Janeiro.

COSTA RICA.—The national government has ordered a high power radio telegraph installation from the United States in order to foster domestic commerce by means of rapid communication and information as to conditions and prospects in foreign markets.

CUBA.—A radio telegraph station on the Central Chapara sugar factory grounds is being established and an office building erected. According to press reports the station will be in operation in September.

HAITI.—The authorities in charge of the radio station at Port au Prince state that the station is now ready to accept commercial traffic for all parts of the world.

NICARAGUA.—Effors are being made to arrange for a more powerful radio telegraph station to replace the outfit now being used by the United States Marine Corps at Marte Field, Managua.

### Baudot Telegraph System in Great Britain.

The application of the Baudot telegraph system has recently been started in the London-Dublin service, giving a total of eight channels—four each way—working at a speed of thirty words per minute.

ON MARCH 15, 1861, telegraph communication was established between the Atlantic coast and California.

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# Universal Duplex Apparatus

## In Use By the Western Union Telegraph Company

*(Continued from page 376, August 1 issue.)*

### DUPLEXING THE CIRCUIT.

This consists in making the home relay irresponsive to the signals transmitted from its own station but responsive to those sent from the distant station. This may be done by placing the main line relay in the "bridge" of the so-called bridge duplex or by providing it with two equal windings and connecting them in opposition, one in the main line and one in the artificial line, as is done in the differential duplex and also by other known methods.

In this description the differential duplex method will be followed. The relay has two exactly similar windings, one terminal of each being connected to a differential mil-ammeter, and thence through its windings to a common conductor, to the transmitting apparatus, the other two terminals leading to the main line and artificial line. The latter is made as nearly as possible the exact counterpart of the real line by balancing the resistance of the artificial line with that of the main line, so that when signals are sent from the home transmitter the current will divide and pass through the two windings of the home relay equally, but in opposite directions, and hence have no effect upon it. The incoming signals, however, pass through the relay windings in such a manner as to operate it. It is essential that the two circuits, the one through the one relay winding and the artificial line and the other through the other relay winding and the main line, shall be equal, or balanced, otherwise the home relay will be affected by the outgoing signals.

### BALANCING OPERATIONS.

It is a more difficult matter to properly balance a circuit for automatic working at high speeds than for ordinary hand signaling. The difficulty arises not so much with the "ohmic" or resistance balance as with the "static" compensation, a high degree of which is absolutely essential to first-class working at rapid rates of speed.

While the difficulties to be contended with are sometimes inherent in the wire itself as a result of its nature, surroundings, etc., they also arise from the fact that mil-ammeter indications cannot always be relied upon as a guide in balancing the instruments, in the case of high rates of speed as is the case with the lower rates of speeds of hand signaling or Morse operation; these instruments being more or less insensible to slight static irregularities that frequently affect the incoming signals. On this account the character, or quality, of the signals as noted upon a recording slip will better serve the purpose and more clearly indicate the direction in which to secure the desired regulation. A series of three condensers and a corresponding number of retarding coils, are inserted in the circuit of the artificial line as a provision for securing as nearly as possible electro-static conditions in the artificial line corresponding with those present, or liable to arise in the main line.

When a current of electricity is first sent into a wire, a portion of the electricity becomes condensed on its surface by an inductive action that is progressive along the entire length of the circuit. When the battery contact is broken and the line is put to ground, the charge thus accumulated is set free and becomes partially discharged through the wire as a "return current" in the direction of the sending station. If the conductor be very long it will be obvious that a sensible period of time will be occupied in fully charging the successive portions of the wire and that the "static" currents will encounter more or less resistance that will retard their rate of flow. Not only, then, must the conditions in the artificial circuit be made to agree with those in the main line, so far as their respective "capacities" are concerned, but the time involved during the process of charging or discharging the artificial circuit must be the same as that required for similar operations in the main circuit. Otherwise an inequality will exist that will manifest itself upon the mil-ammeter in the nature of a "kick" or more generally by the mutilation or distortion of the received signals.

It will be well to understand in this connection, then, that the static accumulation in a normal line wire is usually greater at points near the sending office, than at places more remote; and for this reason the series of condensers in the artificial circuit ought to be so graduated that the first of the series should possess a condensing surface larger than that of the second, which in turn should be of greater capacity than the last of the series, whose position is at the greatest electrical distance from the source of power. On the other hand, the amount of retarding resistance interposed in the inductive path of each condenser should be arranged in the reverse order, so as to allow the first condenser to discharge through only a comparatively small resistance, the second condenser through a larger amount, and the third of the series through the maximum resistance.

The condenser, therefore, should usually be so arranged along the line of retarding resistances, that the one nearest the relay and having the greatest capacity will discharge through the least resistance, whereas the condenser of least capacity, and fur-

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thest from the relay will discharge through the greatest resistance.

This disposition of the artificial retarding coils, will generally be found to accord well with the amount of retardation ordinarily encountered by the static currents on the main line, during their passage from one point to another, over the various sections of the conductors.

A very different kind of compensation would, however, be required in case the main line happened to be "patched" near the sending station with a long section of wire of much smaller gauge. With such an undesirable combination (which should never be made on automatic circuits except in cases of emergency) the static flow on the main line would take place with less facility through the substituted section of wire, which on account of its high resistance, would force more of the "static" to escape at, or near, the distant ground. To properly compensate for this it would probably be found necessary to reduce the capacity of the first condenser, and possibly also in the second condenser and to increase their retardation resistances.

A bad patch at the distant end of the wire, would, for similar reasons, call for more than the normal capacity, and perhaps less than the usual resistance in the respective condensers and their retarding coils. Since the return current would in this case flow more freely in the direction of the home station, an increase of condenser capacity would be needed on the artificial side to neutralize the greater effects of the main line discharge upon the home apparatus.

In view of what has been said, it will be obvious that had the patches at either end of the circuit been made with a wire of much higher conductivity than the regular conductor, the effects of the static discharges would have been neutralized by methods the reverse of these just described; inasmuch as the "static" like other currents generally favors the paths offering the least resistance to their flow.

The fact that the electro-static condition of a line is more or less affected by variations of weather is well known, so that a knowledge of the climatic conditions existing at the terminals, or other points of a circuit, may often prove serviceable as a guide in determining what particular combination of condensers and retarding resistance is best calculated to produce the most effective static balance. A rainstorm or other adverse conditions at the sending end of the line, for instance, will generally occasion a reduction in the value of the capacity ordinarily employed in the first of the compensating condensers, and may also call for a similar action in a minor degree so far as the second and third of the series are concerned, because the leakage under these circumstances, is so much greater at the insulators as to favor the discharge of the static electricity at such points, leaving only a diminished quantity to take the regular path to ground by way of the home apparatus.

For similar reasons the static discharges from remote parts of the line are less voluminous when bad weather prevails at, or in the immediate neighborhood of such parts, and on this account the capacity of the condensers at what may be regarded as corresponding positions in the artificial circuit will be required to be adjusted to the altered conditions in the main circuit. Since one of the effects of leakage is to practically increase the conductivity of the main circuit and to thus promote discharge, it will be evident that the amount of resistance in the retarding coils of the artificial line may have to be reduced so that the time as well as the distribution of the condenser discharges, shall be more nearly in unison with the shorter periods required to discharge the main line in wet weather.

This time factor is a most important consideration on automatic circuits of considerable length, especially if the conductor has one or more underground sections in it. For, under such circumstances the main line will receive and part with its charge much more slowly than the artificial line and a proper working balance for high speeds will not be obtained until the charge and discharge from each are not only alike in amount, but correspond in duration. As a general rule, the electr-static capacity of a line is higher and less liable to fluctuate in dry than in wet weather; although it may occasionally be noticed that the condensation of moisture upon the cross-arms, insulators, etc., under slightly moist conditions, will temporarily increase the inductive capacity of the line.

The amount of electricity that accumulates upon a conductor is always greatest in very dry and frosty weather, when the dielectric properties of the air are a maximum and the leakage at the points of support a minimum. But, since the circuit is generally quite constant at such time, there is little or no difficulty in obtaining the necessary equations, and of maintaining the highest possible rate of speed that the inductive capacity and resistance of the wire will admit of.

A bad escape at one or more points in a circuit is very apt to produce a variable static disturbance especially in damp and wet weather. The utmost difficulty will then be experienced in holding the balance sufficiently steady to admit of the maintenance of working at other than slow speeds. It is always advisable at such times to have the wire changed.

It is, of course, impossible to be cognizant of or to anticipate all the changes and variations that are liable to affect a circuit from natural or other causes; and, for this reason disturbances of the balance will frequently occur that cannot be counteracted by methods suggested from the partial knowledge possessed of the condition of the circuit. In such cases, the only guide to an accurate reproduction of the unknown conditions prevailing in the main line will be afforded by the appearance of the incoming signals during the initiatory stages of balancing the wire.

### COMPENSATING APPARATUS.

The adjustable resistance of the radial arm rheostat affords a means of producing the neces-

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sary equation so far as the simple "ohmic" resistance of the line is concerned; the three condensers furnish the required amount of electro-static capacity to compensate for the electro-static on the main line, while the retarding resistances are introduced in the condenser circuits with the view of regulating the rate at which the various condensers charge or discharge through the artificial circuit, to correspond with the time occupied, or retardation encountered by the static currents which flow through the main line wire. By such means it is possible to artificially reproduce in the one circuit the various natural conditions existing in the other. The difficulty of so doing, however, generally increases with the speed of signaling, for a balance which may be sufficiently good for all practical purposes at low speeds, will oftentimes be found to be more or less imperfect and to exercise a disquieting effect upon the recieved signals at high speeds. Hence the desirability of directing special efforts to the matter of static compensation on fast-working circuits and of anticipating as far as possible the conditions most likely to be met with, so that the several equations may be fully secured with the least loss of time during the act of "taking a balance."

### METHODS OF BALANCING.

*General.* For balancing automatic circuits an instrument known as an undulator is provided, a description of which is given under the heading "Undulator."

The method used in balancing Morse circuits in which a mil-ammeter is used in conjunction with a polechanger key to indicate the ohmic or resistance balance may be used for obtaining a preliminary resistance or ohmic balance, but this should not be depended upon for taking the static balance except for a rough approximation.

As the undulator will indicate when both the ohmic and static balances have been obtained it can be used for the complete balancing operation, although both methods should be used jointly and will be so described. When the undulator is used for balancing it is bridged across the main and artificial lines.

The first essential with either method is to center the main line relay tongue. This is done by cutting off the current from both the home and distant ends of the line and from the local circuits by means of the local snap switch, and by adjusting the contact stops so that the tongue will remain on either stop when moved with the finger.

The repeater station wishing to balance the west section of the line should ask the western terminal or next repeater station west of him to open his key which puts a steady spacing current to line. He should then throw the three-point switch on the base of the polechanger key on both east and west sides of the repeater to the right. This puts spacing current to line and will cause the tongue of the line relay at the home or balancing station to rest against the left hand or spacing stop and also deflect the mil-ammeter needle to the left. When balancing with the undulator bridged or with the mil-ammeter, the leak circuits should be opened as otherwise a slight error in balance may be obtained due to the constant drain on one polarity. While this unbalance will seldom be sufficient to impair the efficiency of operation it may lead to confusion.

### RESISTANCE BALANCE.

Note the number of degrees on the west mil-ammeter scale to which the needle is deflected, first with your key open and then with it closed.

While the key is in the closed position, adjust the balancing resistance until the needle reaches a point midway between the two readings noted, which point will represent the deflection required to secure the ohmic or resistance balance. If, for instance, the needle stands at 14° on the open key, and at 10° on the closed key, the adjustment of the resistance should be such as to bring the needle to a position that will correspond as nearly as possible with the mean of the above two readings, viz.: 12°.

It will be found that when the resistance in the artificial line is greater than that in the main line, the needle will swing somewhat deliberately in a spacing direction upon closing the key. On the contrary, the swing of the needle will be in the marking direction when the resistance in the artificial line is less than that in the main line.

### STATIC BALANCE.

It will next be in order to take an approximate "static" balance, any disturbance of which will make itself evident by a sudden throw of the mil-ammeter needle, which will quickly jerk or "kick" in one direction just as the key is being depressed, and in the opposite direction, at the moment the key is released, the needle instantly returning to its normal or steady position after each movement of the reversing key.

In order to avoid confusion during these balancing operations, it will be well to disregard the effects produced upon the needle at the opening of the key, and take note only of those observed at the closing thereof. If, then, upon closing the key, the needle swings, or kicks, in a marking direction and then rapidly returns to its former fixed position, it wll be an indication that the capacity of the condensers in the artificial or compensating circuit, is not enough and should accordingly be increased. If, on the other hand, the throw of the needle is in the spacing direction at the instant of depressing the key, the condenser capacity should be diminished.

The amplitude of the swing or kick in each case will show the amount of the static unbalance, the latter depending upon the difference in strength between that portion of the current which suddenly rushes into, and charges, any main line possessing electro-static capacity and the portion rushing into the artificial line to satisfy the "capacity" requirements of the condensers forming part of the compensation circuit.

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### RETARDATION BALANCE.

If the retarding resistances in the paths of the balancing condensers are not accurately adjusted, the time occupied in charging and discharging the condensers will differ from that required to charge and discharge the main line. Should this difference be very pronounced, the mil-ammeter will give a peculiar "double kick" each time the key is opened and closed. This kick is readily distinguishable from that due to the ordinary static unbalance, in having a decidedly more jerky and lively appearance during its exceedingly brief period of existence. It may, however, be somewhat difficult to differentiate between the two, on account of the constant vibration to which the mil-ammeter needle is ordinarily subjected by induction from neighboring wires. The effects of such interference render accurate readings and close observations a matter of considerable difficulty.

You should now have an approximate static or capacity balance, and it is at this point that the undulator should be switched in and used for perfecting the balance by inserting the undulator plug in the west bridge jack, first shunting it so as to avoid too great an amplitude of the siphon during the first adjustments. As the balance is improved the value of the shunt should be increased until the best condition is obtained with no shunt at all.

### CAPACITY BALANCE USING UNDULATOR.

To adjust the static or capacity balance ask the east terminal to send reversals. If the circuit is a multiplex circuit this will be done by the terminal station sending alternating current from his distributor. The west terminal station should also be requested to send reversals. The condenser values and the retardation resistances should now be adjusted until the undulations of the alternating current received from the west are practically uniform and regular. If the reversals on the tape appear as groups of undulations rising from a minimum to a maximum amplitude and dying away to a minimum again at regular intervals, it is an indication that the balance is imperfect. Capacities and retarding resistances should be adjusted until these groups of undulations disappear and the tape shows a regular line of undulations of uniform amplitude, when reversals are being sent in both directions.

Where a Wheatstone receiver is used as a balancing instrument it is only used in that capacity in the local circuit of the main line relay, and the condition referred to above will be indicated by variations in the length of the dots and spaces of the reversals received. Wheatstone receivers, however, are assigned for balancing purposes only where the automatic circuit is operated at comparatively low frequencies.

### UNDULATOR.

The undulator is a sensitive recording instrument. It records signals on a moving paper tape by means of a small glass or silver siphon, one end of which dips into a well of ink while the other end rests on the moving tape. This siphon is mounted on an extension of the armature spindle or shaft which oscillates between a pair of electro-magnets in response to the received signals.

The paper tape is moved between the point of the siphon and a curved metal platform by means of a small 110-volt motor operating a train of gears and friction disks. The speed of the tape movement can be regulated by means of a knurled metal knob or handle on the gear case.

The magnets of the undulator are bridged by an adjustable shunt mounted on the base of the instrument. This shunt is for the purpose of regulating the amplitude of the signals and also for minimizing, as far as possible, the effects of induction upon the siphon.

The two coils are in series and have a resistance of upward of 800 ohms. They are mounted on a frame with an adjustable carriage having a right and left handed screw thread, so that by operating a thumb screw the coils are either moved farther apart or brought closer together, in the latter case increasing the sensitiveness of the instrument. The coils carry pole pieces faced with a thin piece of sheet copper, to prevent sticking between the pole-pieces and armature, when the coils are brought close together.

The armature is made up of two small permanent bar magnets, 2¾ inches long by 1-8 inch by 1-16 inch, secured to a spindle by means of two narrow copper bands. The lower end of the spindle fits into a jewel bearing fitted into a cup formed at the extermity of a small screw. The screw is so arranged that the end play of the spindle can be adjusted. The upper part of the spindle passes through a jeweled bearing in a brass arm fixed over the left hand coil, the extremity of the spindle carrying the saddle provided for mounting the siphon. The spindle also carries a horizontal brass arm, to the end of which are attached two very light spiral springs used for the purpose of keeping the armature in a central position between the pole pieces of the coils. This position is adjusted at the outset, and any further alterations are made by means of a small thumbscrew, projecting from the undulator head, which enables the tension on the two springs to be varied, i. e., it increases the tension on one and decreases it on the other and vice versa, thus enabling a very fine adjustment to be maintained.

The inkwell is fitted on the frame immediately behind and a little higher than the coils, but slightly lower than the upper end of the spindle. It can be raised or lowered by means of a rack and pinion by a thumbscrew, fitted on the front of the undulator head, so that it may be cleared from the siphon when the instrument is not in use. Provision is made for its removal altogether, for the purpose of cleaning, etc.

The small brass saddle fitted on the upper end of the armature spindle is secured in position by means of a clamping screw. When in place the saddle takes a position of approximately 45° angle with the spindle.

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The upper end dips into the inkwell while the lower end rests lightly upon the slip. The siphon is fixed in the saddle by means of sealing wax. It will be seen that any adjustment of the armature will alter the position of the siphon relative to the slip. Its proper neutral position is in the centre of the slip. The frame carrying the coils is fitted to the base of the instrument by means of two pins which fit into cups provided on the brass work of the carriage and thus form a hinge for raising them. A small crank lever enables the coils and carriage to be slightly raised so that the siphons may be lifted off the slip when not in use. The connection between the coils and the instrument base are made by means of two flat brass springs. A micrometer screw fixed on the base of the instrument and immediately under the coils is provided for adjusting the pressure of the siphon on the slip.

Provision is made on the upper part of the driving mechanism case for keeping the slip fairly taut and carrying it forward. A small adjustable metal piece over which the slip passes and on which the siphon rests, can be moved either horizontally or vertically to meet the varying length of the siphons.

When the apparatus is in a normal position the lower end of the siphon rests on the paper and the upper end dips into the inkwell. A flow of ink is obtained through the tube by capillary action, causing a continuous line on the paper slip, called the zero line. The flow of the ink can be started by using a small india rubber ball and tube furnished with the instrument. When reversals of current pass through the undulator coils the bar magnets are deflected from right to left and vice versa; this causes the lower end of the siphon to be drawn away from the zero line, and the new position will be maintained until the current is reversed, in which event the siphon will move to the other side of the zero line. From this action it will be seen that the new or intermittent line on the slip may represent incoming signals joined to the zero line by lines at right angles to it. If the adjustments are satisfactory, what is known as square top letters are formed at a low speed. As the speed increases the tops become more rounded and the amplitude less, until with a high speed the signals become undulations with a very small amplitude. The amplitude can be increased either by increasing the resistance of the shunt, bringing the coils closer to the armature, or reducing the pressure of the siphon on the paper. Present practice is to limit the amplitude of the siphon by means of a guard. This limits the height of the signals on the tape.

The undulator may be used as a receiving instrument, recording the signals upon a moving tape in the form of undulations or as a balancing instrument.

Two jacks are provided on the repeater table, of which one position bridges the undulator across the main and artificial lines for balancing purposes and the other connects it in the leak circuit for the purpose of noting the character of the received signals.

### WHEATSTONE RECEIVER.

The Wheatstone receiver is a recording instrument in which the record is made upon a moving tape in the form of horizontal ink marks.

The main features of the Wheatstone receiver are a pair of electro-magnets; a polarized armature; a curved arm attached to the armature spindle carrying a light shaft upon the end of which is mounted a small marking disk. The marking disk rests in the groove of an inking wheel which rotates in a small inkwell. The grooved inking wheel and ink receptacle are mounted on the outside of the case of the receiver. The gear train of the motor drive moves the tape between two rollers and in front of the marking disk. The grooved inking wheel is rotated by the gear train so that it carries the ink in its groove and insures that the edge marking disk, which is also rotating, will be supplied with ink.

To obtain clear and distinct marks upon the Wheatstone receiver slip and to secure at the same time the necessary delicacy of regulation for high speed careful adjustments should be maintained.

The ends of the permanent magnet should be so adjusted by means of a screw extending through and to the front of the receiver that there will be an air gap between the pole extremities of the permanent magnet and the armatures of approximately .010 of one inch.

With the armature magnetically centered, which can be accomplished with the regulating screw, the play of the armature between its limiting stops should be kept as small as possible consistent with clear signals, otherwise the recording speed will be limited.

As the magnetic center of the armature is not the same when the receiver is idle as when running, because of the mechanical inertia of the marking spindle and associated parts, the center should be obtained finally by means of the regulating screw when the receiver is running.

The curved arm should be so adjusted on the armature shaft that when the inking disk is pressed aganist the recording tape the spring on the curved arm just leaves the tip of the curved extension.

The spindle of the inking disk is carried in a socket in the curved arm, the spring of which should be so adjusted that there will be no excessive lost motion of the spindle in the socket, but should not be so closely adjusted as to prevent the spindle from revolving freely in its socket.

When these adjustments have been made the ink disk touches the paper at the same time the contact extension of the lower armature touches the left hand contact. To obtain finer adjustments let the paper tape run slowly and gently press the lower armature tongue against the left hand contact screw, which action should produce a mark on the paper tape. Turn the regulating screw towards spacing until the recorded line is broken, then reverse its motion until the line is again perfect, after which give the regulating screw a turn to spacing until an irregular broken line appears on the slip. Under normal conditions the receiver should now have a working adjustment.

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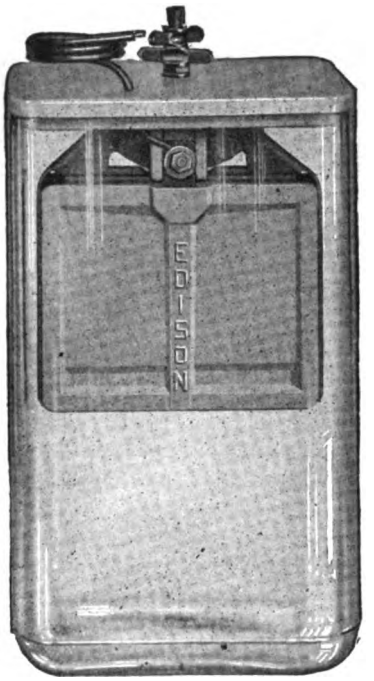
# FOR CLEAR TRANSMISSION

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### American Railroad Association—Telegraph and Telephone Division.

At the July meeting of the Committee of Direction of the Telegraph and Telephone Division, American Railroad Association, held in New York, action was taken to form a Special Committee charged with the duty of drafting recommendations for the procedure to be followed in handling committee work, conduct of meetings, etc. G. A. Cellar, superintendent of telegraph, Pennsylvania Railroad, Pittsburg, Pa., was selected as chairman of this committee, which is to be known as the Special Committee on Future Activities.

Mr. Cellar announces the appointment of the following named members of the committee: E. A. Chenery, general superintendent of telegraph, South Western Region, U. S. R. A., St. Louis, Mo.; H. Hulatt, manager of telegraphs, Grand Trunk Railway System, Montreal, Que.; J. A. Jones, superintendent of telegraph, Southern Railroad, Charlotte, N. C.; E. C. Keenan, general superintendent of telegraph, Eastern Region, U. S. R. A., New York; E. L. King, superintendent of telegraph, Southern Pacific Railroad, San Francisco, Cal., and Donald McNicol, editor, TELEGRAPH AND TELEPHONE AGE, New York.

On page 401 of TELEGRAPH AND TELEPHONE AGE, August 16, was given an outline of the proposed activities of this committee.

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JOHN L. NIESSE, engineer telegraph department, Big Four Railroad, Indianapolis, Ind., recently conducted interesting investigations as to the nature of the disturbances in telegraph circuits operated duplex and quadruplex. Oscillograph records were made illustrating the exact current conditions obtaining under varying conditions.

C. W. BRADLEY, superintendent of telegraph of the Chesapeake and Ohio Railroad System, Richmond, Va., will celebrate his birthday on September 13. It was eighty-three years ago that Mr. Bradley discovered America. His numerous friends propose to give him a "round up" on this occasion.

E. A. SMITH, formerly superintendent of telegraph of the Fitchburg Railroad, Boston, Mass., is the Republican candidate for the Massachusetts leglislature representing Somerville, Mass. Mr. Smith was formerly alderman.

W. M. KEENAN, telegraph traffic supervisor, Northern Pacific Railroad, is located in the office of superintendent of Telegraph E. E. Dildine, St. Paul, Minn.

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IN THE YEAR 1862, the Northwestern Telegraph Company erected a No. 8 iron wire between Milwaukee, Wis., and St. Paul, Minn. At various points where the wire crossed and re-crossed the Mississippi river, watchmen were stationed to lower the wire into the river as steamboats passed up or down.

### Canadian Telegraph and Telephone Statistics.

Statistics relative to telephone and telegraph companies doing business in Canada, covering the year which closed on June 30th, 1918, were tabled in the House of Commons recently by the Minister of Railways. According to the *Electrical News*, a substantial development of the telephone business is noted. The number of reporting companies increased from 1,695 in 1917 to 2,007 in 1918. The growth was greater in Saskatchewan than in any other province; the Governments of Alberta and Manitoba own practically all of the telephone systems in the two provinces. Saskatchewan is also a large owner of telephones, but there are, in addition, in that province about 1,000 lines in the hands of private organizations. The capitalization of telephone companies operating in Canada is given as $85,274,691, and the cost as $104,368,627, an increase of $10,000,000 as compared with 1917. Earnings of the companies in the 12 months under review amounted to $22,753,289, while operating expenses totalled $13,644,524. Net earnings were $9,108,765 in 1918, as compared with $8,025,855 in 1917.

Coming to the telegraph companies, the figures presented show that on June 30th, 1918, their cost was placed at $10,226,988, a slight increase over the previous year, while the capitalization of the companies having headquarters in Canada was $6,300,000. The gross revenue was $7,770,646, as compared with $7,272,755 for the previous 12 months. Operating expenses were $5,820,335, as compared with $4,940,228. The net operating revenue amounted to $2,016,429. Wire mileage totalled 210,100, a slight increase over the previous year. The number of telegraph offices totalled 4,664, as against 4,615 at the end of June, 1917.

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### Canadian Telegraph Rates.

The telegraph companies operating in Canada have applied to the Dominion Railway Board for permission to increase telegraph rates. The present rates have been in effect since 1916.

"REMCO"
ALTERNATING CURRENT SELECTORS
(Controlling Patents)
Tested and Proved
Manufactured only by the
RAILWAY ELECTRIC MANUFACTURING CO.
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## NEW RAILROAD TELEGRAPH INSTALLATIONS.

On the lines of the New York Central and associated railroads there have recently been installed several up-to-date telegraph offices. One of these, "HW" office, District Director H. A. Worcester's telegraph office in the Union Central Building, Cincinnati, Ohio, has been equipped by the C.,C.,C., and St. L. telegraph department with a circuit concentration arrangement as complete as modern commercial telegraph installations.

The equipment in this office includes eighteen selectors on twelve single lines, and six combination loops for duplex legs or single lines. Each selector has an answer-back and bull's-eye signal which operates a pilot lamp and buzzer. The operating table is a six-position affair, four positions arranged for either single or duplex operation, and all six may be used for single line operation.

Above this table is mounted a noteworthy improvement in message racks replacing the hooks formerly used for this purpose. The rack is accessible from both sides. Messages placed in any one of the thirty-five compartments are held in place by gravity clips which prevent the messages being blown away or displaced. This rack is for outgoing traffic. Blank message forms are placed in a specially designed tray which is a part of the operating table.

This office was installed by Chief Telephone Installer R. D. Meredith, and his assistants of the C., C., C. & St. L. Railroad electrical staff; the plans and engineering work having been done by Stanley Rhoads, telegraph and telephone engineer of the Eastern Region, U. S. R. R. Administration.

The office has two Pennsylvania Railroad duplexes, also circuits radiating to Chesapeake and Ohio, Norfolk and Western, Baltimore and Ohio, and Big Four trunk lines.

At the Springfield, Ohio, division headquarters' office of the C., C., C. & St. L. Railroad has been installed a modern motor-generator outfit. A unit type of standard dynamo bench is used which provides for the mounting of machines in tiers—bottom row and top row. In this installation there are twelve machines, including three Western Union 240-volt machines used to furnish current for four duplexes, two quadruplexes, six convertible half-sets, and one full-set of repeaters. The Western Union machines are Robbins and Myers type P, three-quarter horse power, the other machines being Western Electric M. I. C. type.

Such motor-generators require no starting boxes, so that simple snap-switches are all that is required to start and stop the machines. This makes it possible to mount the switches, individual volt-meter, fuses, rheostat and circuit breaker for each machine on the fuse panel immediately above the machine.

The other motor-generators; that is, the machines designated as the railroad company's units, supply current for individual telephone selector circuits, of which there are the following: Two dispatchers' (one of them in three directions out of Springfield) and four message circuits. The test board also handles dispatchers' and message circuits to Indianapolis, two phantom circuits, two long distance lines, and two block simplex circuits.

The generator circuits are carried through a jack-panel en route to the signaling sets. This permits connecting any generator to any circuit. A no-voltage release is provided in the power line to prevent all machines starting simultaneously after a temporary shut down which would cause line fuses to blow due to rush of starting current. The machines, therefore, are started one at a time. The railroad company supplies the power from its shop plant, but a city power line is in reserve, operating a 3-phase motor generator, large enough to operate all of the small machines.

At this office terminate six single Morse wires, two duplex repeaters, two duplexes, and two quadruplexes.

The railroad company's single position Private Branch Exchange handles the long distance business, and although at present no connection exists with city service it is the intention eventually to provide for this convenience.

### UNIQUE SIGNALING SCHEME.

In station offices an arrangement is provided for calling to the telephone any official or employee desired. A ten-pair cable connects a row of push-keys at the Private Branch Exchange to a row of bull's-eye signals, Western Electric type 10 C, at each telephone, restoration being accomplished by means of a button situated underneath the signal. The signals designate exactly which line the called party is wanted on.

Similar installations have been made at Bellefontaine, Ohio; Mattoon, Ill.; Indianapolis, Ind.; Van Wert, Ohio; Wabash, Ind.; and Galion, Ohio.

It is noteworthy that in all present and projected telegraph and telephone installation work on the lines of the New York Central, C., C., C. & St. L., and associated railroad lines, General Superintendent of Telegraph, E. C. Keenan, New York, and Superintendent of Telegraph, C. S. Rhoads, Indianapolis, Ind., are taking advantage of available technical talent in order to secure the most efficient and economical plant equipment.

## Paging by Sounder.

In the immigration station at Seattle, Wash., a telegraph system has been installed by means of which paging of employees is carried on, and instructions issued by wire, regardless of where the person desired may be located in the station buildings. Telegraph sounders are installed in every room and corridor of the buildings. Each employee has a call signal and a simple system of code signals has been made up enabling an information operator in the general office to communicate such requests as "answer at the telephone," "come to the main office," etc. Provision is made for acknowledgements, by means of a telegraph key.

It is said that the telegraph signal system has proven very satisfactory.

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## THE TELEGRAPH PROFESSION.

BY H. HULATT, MANAGER OF TELEGRAPHS, GRAND TRUNK RAILWAY SYSTEM, AND GRAND TRUNK PACIFIC RAILWAY, MONTREAL, QUE.

The head of a telegraph organization is very frequently asked by parents: "What prospects has a young man entering the telegraph service?" Personally my invariable reply has been that prospects are good, provided the applicant aims to become something more than an ordinary operator, by taking steps through constant study to equip himself for the bigger positions, thereby keeping abreast of the times. In this connection it is well for us all to realize that today the telegraph profession is entering a period of new development and of great changes.

Not so many years ago, if a railroad superintendent of telegraph could use the Morse code, had a knowledge of wire testing, understood the proper care of gravity batteries, how to set up a duplex or quad, coupled with a rough and ready knowledge of construction matters, he, to use a common expression, "filled the bill". Needless to say such requirements did not call for highly trained technical men, and as a result salaries could not be said to be attractive.

Are prospects today any brighter?

It can probably be stated without fear of contradiction that the first move to place the railroad telegraph profession on a higher plane, was the inauguration of telephone train despatching, necessitating apparatus developed mainly, not by telegraph men, but, by the highly trained technical men of the telephone profession, and affiliated manufacturing interests. As a result of this development railroad telegraph men have gradually been obliged to study and be able to intelligently and efficiently handle simplexes, private long distance telephone circuits, also the phantoming of circuits, the installation and maintenance of motor generators, installation and care of printer telegraphs, telautographs, and other types of electrical and mechanical labor and time-saving devices. These developments have also as a result brought prominently before superintendents of telegraphs and their staffs that most complex problem "inductive interference," and necessity for close study of same by keeping posted on the results of the various researches made by experts making a specialty of such problems.

A perusal of the report of Committee No. 5., of the Telegraph and Telephone Division of the American Railroad Association, of which J. A. Jones, Superintendent of Telegraph, Southern Railroad Lines East., is Chairman, presented at the Chicago meeting of the Division in June last, covering as it does recent developments in telegraph and telephone practice and apparatus, indicates very clearly that we are just entering an era of great changes. There is little doubt that in the near future such problems as multiple telephony, wireless telephony and telegraphy, also many new methods of multiplying the use of existing facilities without the erection of additional outside plant will have to be considered by the men of the railroad telegraph departments.

While there are undoubtedly exceptions, and some extremely bright ones,—as a general rule are the employees of railroad telegraph departments technically equipped to meet the ever changing conditions? Frankly, I think it must be admitted that they are not, and in their own interests, and particularly in the interests of their employers they should undoubtedly take prompt steps to remove the disability under which they are laboring. Such action on their part will be to the benefit of their companies, and incidentally do much toward improving their own financial status.

Our profession has entered into what may be termed the higher technical field, and the necessity is present for us all, whether we be officers or privates to endeavor to equip ourselves mentally for the much greater problems and responsibilities we shall undoubtedly be called upon to study and assume in the coming years.

If we fail to measure up to requirements, our employers can easily replace us by securing from the "outside" men having the requisite technical training; consequently I am writing this article from a selfish point of view, feeling as I do that the "plums" from the tree should be for those who are members of the family, therefore, we who are in the profession or family should ensure that we have the ladder to reach the fruit, and that ladder, to my mind, is better education and technical training.

I can imagine some "old timer" (and by the way we of the younger generation have a great deal to thank the old timers for) on reading this, saying: "Technical training only creates theorists; what we need is practical men." This prejudice against theory is out of date; the law of gravitation is a theory—no man ever saw it actually in operation. As Dr. Joseph French Johnson, Dean of the New York University School of Commerce, Accounts and Finance, states in his really wonderful book, "Business and the Man":

"Our railroads, steamships, bridges, and factories, with all their machinery have been constructed in harmony with theories that have been carefully thought out and tested. If man theorized no more and began to forget what theory has already taught him, in a few generations the human race would again be in a state of barbarism".

What we need is a thorough knowledge of theory, and the best method of applying it in practice.

It is possible I have in the foregoing looked upon the dark side, but it has always seemed to me, especially within the past eight to ten years, that the rank and file and also subordinate officers of railroads, in so far as promotion is concerned, have been satisfied to adopt a policy of "watchful waiting," in the hope that the man above them would retire, be promoted, or transferred, and

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that if they *were lucky* possibly they might be promoted to the higher position.

The majority of such men are doing their level best to give their company one hundred cents or more for every dollar of salary they receive, yet, it has not seemed to dawn upon them that a much more rapid promotion awaits them provided they equip themselves mentally over and above their competitors by studying not only the technical features of their work, but what is even more important by securing a thorough knowledge of the laws and principles governing business phenomena, and the practical application of same.

The "Executive" today (and to be one should be the ultimate aim of the latest messenger boy added to the pay roll), must be an intellectual power, aggressive, and broadminded. Such attributes he can only attain by practical experience backed up by thorough and ever progressive education.

## A Test for Vacuum Arresters.

Vacuum lightning arresters may be tested by means of any ordinary spark coil. One method which may be used, where a separate coil is not available, is to connect the terminals of the arrester to the secondary of the coil; for instance, connect one of the leads of the spark plug of an automobile or a motor cycle to the frame of the machine and attach the terminals of the arrester so that the secondary current will discharge through the arrester. A good vacuum is shown by a violet or bluish glow in the arrester bulb. If the test is made in daylight, it may be necessary to shield the bulb in order to observe the effect.

The Brach Manufacturing Company is now producing arresters in which the vacuum is guaranteed for a period of two years. In ordinary service the vacuum should last many years; in fact, is practically as reliable and constant as the vacuum in an incandescent lamp globe. Breakage of the arrester bulbs which heretofore has been a consideration has been taken care of in the new designs now being distributed, and nothing short of malicious handling will result in breakage.

## British 1919 Blue Book Now Ready.

British electricity supply undertakings, electricity supply schemes, projected provisional orders, undeveloped British electric power companies, colonial electricity supply works, Russian electricity supply works, foreign electricity supply works, colonial tramways and railways, foreign electric tramways, and Argentine electricity works.

All of these subjects are covered in the new year book just issued. Copies may be purchased from TELEGRAPH AND TELEPHONE AGE at $1.25 per copy.

IN THE PLAY "A MIDSUMMER NIGHT'S DREAM," QUINCE, ONE OF THE CHARACTERS, SAYS: "BLESS THEE THOU ART TRANSLATED." HEARD EVERY DAY IN THE CIPHER ROOM OF THE STATE DEPARTMENT.

## PROFIT-SHARING.

The tendency of well organized businesses and governments is to extend benefits to the individuals who compose them. Universal well-being is a product of democracy, and slowly but surely our political system has brought with it the disposition on the part of employers to give the employee a share in the responsibilities and benefits arising from industrial and commercial enterprise, through various methods of profit-sharing.

The question very naturally arises as to why any employer of labor should give anything more than the wages or salary agreed upon. Although at first glance it might appear that any additional grant to the employee would be actuated only by philanthropic motives, yet, after investigation, it proves to be profitable to both employer and employee.

Profit-sharing benefits the employer by anticipating a demand on the part of the employee to share in the wealth which he has aided in creating. A voluntary concession on the part of the employer avoids such a demand with a lower percentage of actual capital outlay than the ordinary demands on the part of the laborer would involve. At the same time, the saving effected by the stabilization of labor conditions in his organization enables the profit-sharing employer to give his workers much higher rewards than would otherwise be practicable. Thus the working and income conditions which profit-sharing produces go far toward eliminating discontent and preventing labor difficulties.

Cultivation of the individual workman's interest in his daily tasks is another desirable result of profit-sharing. Men and women work because necessity demands that they meet their daily needs. Nevertheless, there is no incentive to voluntary endeavor and the exercise of personal initiative so potent as a valuable consideration given in special recognition of service rendered. The best method for stimulating such personal interest is through the reward for meritorious services by means of a bonus or profit-sharing system.

Stabilization of labor is, perhaps, the most profitable phase of profit-sharing from the employer's viewpoint. Every employer of labor realizes the tremendous loss sustained through the labor turnover due to replacing employees who leave on account of apparent advantages to be gained through a change. A bonus system obviates this difficulty, for it holds the higher grade of employee at a lower net cost than would be possible without such a system. The workman receives more money, but the total amount paid out by the firm is less, because the increase paid through the bonus or profit-sharing system is less than the loss sustained by continuously hiring and training new men.

Waste reduction and prevention constitute another profitable element of profit-sharing. Everyone working on a profit-sharing basis has a selfish interest in endeavoring to eliminate waste and in raising the standard of efficiency. This disposition, of course, tends to increase profits.

The development of good-will among the general

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public is another highly profitable outcome of profit-sharing. Purchasers have greater confidence in firms employing a bonus or profit-sharing system, for the maintenance of such a plan not only argues well for the stability of an organization, but also gives an assurance of fair dealing and satisfaction. A firm that deals fairly with its employees will certainly do the same with its customers. The contracts of such a firm, too, are more dependable, for there is but little risk of disappointment in deliveries through delays caused by labor difficulties.

The benefits of a bonus system or profit-sharing plan, of course, are by no means confined to the employer alone. Obviously, there is the immediate benefit of increased income achieved without resorting to drastic measures. Under such a system there is no need for strikes, whose cost is always paid by the workman.

Profit-sharing, moreover, tends to increase the individual worker's earning capacity insofar as it stimulates his interest in his work and thus leads him to the development of more efficient methods of performing his duties. The logical outcome of such interest and development, of course, is greater ability with consequent, greater rewards. Recognition of such progress is necessarily swift under a profit-sharing system, for careful supervision and scrutiny of the work of every individual constitute an integral part of the plan. Consequently, the efforts of the energetic and ambitious worker are sure to be noticed. The incompetent workman is spurred on to meet the standard set by the competent workman, and the energetic workman is spurred on by the knowledge that service rendered will receive recompense in just proportion.

In most profit-sharing systems, the pecuniary advantages accumulate by arithmetical progression, and are thus cumulative in the later years of a man's active life.

Profit-sharing systems give the employee assurance of continued employment, and such assurance permits him to formulate definite plans for the thrifty management of his affairs. As soon as a man feels that he is permanently employed, he can establish himself by buying his home, thereby beginning the accumulation of an estate.

What plan is most desirable and most adequate in a given establishment depends largely upon the nature of the business and its organization. Any system, however, based upon the fundamental principle of reward for service, will prove mutually profitable and advantageous to employer and employee. It is possible to accomplish the desired results, for instance, by giving to the employees a percentage of the gross or net profits of the company.

Another method, is to grant bonus stock after service of several years.—*The Du Pont Magazine.*

IN "OTHELLO," ACT 3, OTHELLO SAYS: "SILENCE THAT DREADFUL BELL." THERE IS NOTHING ELSE IN THE PLAY TO SUGGEST THAT ACT 3 WAS LAID IN A MUX DEPARTMENT.

## INTERNATIONAL ASSOCIATION OF MUNICIPAL ELECTRICIANS.

The twenty-fourth annual convention of the International Association of Municipal Electricians will be held in Chicago, September 23 to 26, 1919, inclusive. The Convention headquarters will be the Auditorium Hotel, Michigan Avenue and Congress Street.

Manufacturers of electrical appliances used in fire-alarm, and police telegraph signaling service of municipalities will have many interesting exhibits of apparatus at the convention. William S. Boyd, secretary of the Committee on Arrangements, whose address is 175 West Jackson Boulevard, Chicago, has in hand the disposition of exhibits.

In addition to the various reports and technical papers to be presented, entertainment of a social nature is being planned, both for the members of the Association and for lady visitors.

Clark E. Diehl, Harrisburg, Pa., is president of the Association; Clarence R. George, Houston, Tex., secretary, and Jacob Grimm, Buffalo, N. Y., chairman of the Executive Committee.

The selection of the city of Chicago as the scene of this year's meeting undoubtedly will result in a large attendance of fire-alarm and police telegraph superintendents from all parts of the United States and Canada.

### "The Night Operator."

Telegraphers who enjoyed reading "The Wire Devils" will welcome this new book by Frank L. Packard. The book contains a number of short stories written about the alluring game of railroading; the first story, "The Night Operator", is also the title of the book.

In "The Night Operator" you will follow with spell-bound interest a panorama of rushing mountain rivers and dangerous curves, of brave men responsible for the safety of others, who meet their obligation with high hearts and abounding courage.

And when the book is read you will recall with delight "Toodles," the spunky little night operator, "Royal Carlton," the big superintendent, "Regan," the purposeful master mechanic, and "Timmy O'Toole," the valorous Irishman, and say to yourself, "Packard has done it again; written another breathless adventure story; I hope he goes on writing them."

The price of the book is $1.50 net. For sale by TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

Ask the stock salesman if he will guarantee you your money back with interest on ten days' notice. He won't. The government will. Buy War Savings Stamps.

You never have to start with a bank account but once. When War Savings Stamps mature they form a fine nucleus for a bank account.

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# Radio Telegraphy in Competition With Wire Telegraphy in Overland Work.*

BY ROBERT BOYD BLACK., FEDERAL TELEGRAPH COMPANY, SAN FRANCISCO, CAL.

Since the first days of radio telegraphy, numerous attempts have been made by the radio companies to handle commercial business in competition with the land telegraph and cable companies. When there has been any effort at active competition on the part of the wire companies, these attempts have invariably failed. In a few isolated places where wire service was impracticable radio stations have been in operation for several years and have given a suitable return on the original investment. But it is safe to say that until the introduction of the present efficient type of radio duplexes, competition from the radio companies was not looked upon seriously by the wire companies.

Perhaps if the failure of the radio companies were investigated it would be found to be chiefly a matter of lack of business planning. Most of the half-hearted attempts at competition that have heretofore been made by the radio companies in this field have been carried out with an absolute disregard of expense of operation. Competition to be successful must be founded on a sound economic basis, and with due regard to the operating expenses in comparison with those of other companies in the same field.

Facilities for furnishing reliable and efficient service at a reasonable cost have been lacking in the radio field in the past. Radio stations, for the most part have been located in inaccessible parts of the cities they were supposed to serve. In some cases they have been several miles out of the city, which necessitated the relaying of messages over a telegraph or telephone wire, with consequent loss of time, liability to error, and duplication of personnel.

On the radio circuit, the receiver was unable to "break" (i. e., interrupt) the sender, and numerous corrections were necessary, caused by unreliable apparatus, atmospheric strays, interference, and other causes. When the sender had finished, it was necessary sometimes for the receiver practically to skeletonize some messages back to the sending station, in order to secure the scattered missing words from his copy. This resulted in a very ragged looking copy unfit to be delivered directly to a customer, and generally necessitated recopying—a very dangerous practice from the standpoint of accuracy. Moreover, because of the fact that the radio operator has had no means of knowing when he was being called by another station, except when wearing the telephones, he has been under the necessity of keeping the head set on constantly or of making "dates" or appointments with the distant stations. Neither of these methods has proven entirely satisfactory from the standpoint of efficiency.

The constant wearing of heavy, tightly fitting head telephone receivers is distinctly detrimental to the health and efficiency of the operator. Besides the danger of ear infection, there is also the liability to other head troubles arising from the constant pressure and strain involved in this method of reception. Furthermore, an operator wearing head receivers is limited by the length of his telephone cords in performing the other necessary duties of a telegraph office. These duties, in a small office, would include waiting on customers, supervising delivery of messages, and attending to the telephone.

Another disadvantage to the radio companies has been the lack of a sufficient number of feeder stations to supply the main trunk circuits. The leading wire companies have offices in practically every town and village, and the greater portion of the traffic which is handled on the trunk lines between the larger cities is relayed from the smaller towns. The radio companies have usually contented themselves with the establishment of stations in some of the larger cities, handling only the business originating at those points. It is manifestly impossible for one company to secure all the business originating in any one city where there are other companies in competition, and it naturally follows that a network of stations should be operated in order to keep the main trunks working to their full capacity.

Lack of efficient organization and thorough training of employees has, in some cases, proven a great detriment to the development of radio in this field. Because of the use of different telegraph codes by the wire companies and the radio companies in the United States, a number of expert Morse operators, who might otherwise have been available for radio work, have remained with the wire companies. It is hard to train men in a new code in a limited time, and those who have developed into good telegraphers were usually poor electricians, and vice versa. There has been a dearth of fast Continental code circuits in the United States for training operators in high speed work.

All these factors have combined to work against the success of radio in the competitive field, and coupled with the high cost of operation under these conditions, has invariably resulted in the elimination of the radio companies.

With the recent introduction of greatly improved apparatus for both sending and receiving, it would seem that radio is in a fair way to compete with wire service in practically every department of the work, including the handling of fast press service. The art has lately advanced to a stage of fine tuning, minimum interference, and good results with

*From the August 1919 Proceedings of the Institute of Radio Engineers, New York.

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an amount of power that would not have been thought possible a few years ago.

Multiple radio circuits have been thoroughly tried out for a year or two in regular commercial work, and have been found to be quite as efficient and reliable as wire circuits. It has been demonstrated that messages can be copied directly on the typewriter at a station located in the heart of a city, without undue interference from nearby power and radio stations. The increase in traffic capacity of the circuits and the consequent lower cost of operation has made the future of radio look very promising.

Experiments now being conducted with a view to the elimination of head receivers and the substitution of audible devices for receiving, have shown very good results where the received signals are of reasonable audibility. The great advantage of such a receiving device would, of course, be for calling purposes; but its use in regular work would undoubtedly prove advantageous. With a reliable device of this kind an operator would be available, when not actually receiving on one circuit, to listen in, or to receive on another circuit, and at all times be able to hear any other station that might call. Following the system of the wire companies in this respect, one operator could control several circuits, where the amount of business on one circuit would not be sufficient to keep him busy. It would not be necessary to make "dates" with any station. Every station would secure practically uninterrupted service.

From the results actually accomplished to date in radio work, and in view of the improvements which are contemplated, a fairly accurate estimate can be made as to the general organization and conducting of an ideal system of competitive radio telegraph service. Some of the most pressing needs of such a system are outlined in the following.

### MAIN TRUNKS

Between the larger cities there should be established a sufficient number of radio duplexes to take care of all business offered, and to handle it with accuracy and despatch. For the purpose of this paper these stations will be designated as relay stations.

The distance by which these stations may be separated is of course dependent upon factors which would be different in different localities. Suffice it to say that they must be able to carry on fast, reliable communication under all conditions.

### "WAY" CIRCUITS.

From each relay station there should be operated several local circuits, corresponding to the "way" wires of the wire companies. These way stations should be grouped together so that a certain number of them, depending on the business they handled, would send to the relay station on the same wave length. They should each be able to hear every other station in their group in order to prevent interference by simultaneous sending on the same wave.

### RELAY STATION

At the relay stations all business would be handled at the receiving office, which should be located as near as possible to the telegraph center of the city which it served. This would be very necessary in order that the radio company might secure its just share of the available business, and in order to facilitate deliveries from the central location.

The location should be chosen with a view to the erection of an antenna between two or more tall office buildings. The best results would probably be obtained by having the space between these buildings and around them comparatively free from obstruction, but this has not been found absolutely necessary in practice. A ground can be made to any convenient water pipe. Very good results in receiving have been obtained from this type of antenna and the expense of erection has been slight.

The business office, where messages are accepted for transmission should have a good ground floor frontage. The operating room should be located in close proximity to the business office and communication between them should be maintained by a pneumatic tube or similar system.

The operating tables and operators should be grouped together as closely as possible to facilitate the handling of relay messages. On all duplexes the sender should sit directly beside, or oppostie the receiver, and should be provided with a single head telephone or other means of receiving his own "breaks" from the distant station. The sender should also be provided with some device to show that his signals are leaving the sending station properly. There are several ways of arranging a device of this kind, the simplest probably being the introduction of a separate receiving set tuned to the sending wave length. This provides the best possible check on the signals from the transmitter, and permits instant correction of faults in the transmitter, thereby minimizing the necessity for breaking.

All receiving instruments should be easily adjustable from a sitting position. All variable condensers in the sets should be of small capacity, with long indicators moving in a large arc, so that a maximum movement would be recorded for a moderate change in wave length, and the tuning thereby made finer. The points of maximum audibility should be plainly marked.

All control circuits leading to the transmitting station or stations should be available from each position, preferably by the use of telegraph jack and plug switches.

An easy running, visible writing typewriter should be provided for receiving, preferably with all capital letters and without a shift key. Particular attention should be paid to all time-saving features. Devices for increasing the audibility of received signals should be installed as soon as they are found to be practicable for commercial work.

### TRANSMITTING STATIONS

Transmitting stations should be located a suffi-

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cient distance from the receiving office to prevent undue interference. In practice, two or three miles has been found to be sufficient. Normally no receiving should be done at the transmitting station, the whole power output and the regulation of wave lengths being under control of the receiving operator. A wave-changing switch with a sufficient number of points for all necessary changes of wave length should be provided, and these wave lengths should correspond exactly with those of any other transmitting stations in the same city. In case of the failure of one station, another could then be immediatly put on the desired wave length and transmission resumed without delay.

Some signal checking device should be provided with the regular equipment at all transmitting stations, which would allow the operator in charge greater freedom for making repairs and attending to other necessary duties about the station. A sparking wave-meter, coupled to the transmitter helix, and consisting of an inductance and a varable condenser tuned to the sending wave length gives very good results for this purpose. Sparking takes place between the condenser plates, furnishing signals which are audible as long as the set is operating perfectly. The sound may be reinforced by placing the condenser in a resonator.

In all cases where the power is used intermittently, a considerable saving could be effected by providing distant control of the power source.

*(To be continued, September 16.)*

## American Institute of Electrical Engineers.

TELEGRAPHY AND TELEPHONY COMMITTEE.

The Telegraphy and Telephony Committee of the American Institute of Electrical Engineers, for the administrative year beginning August 1, 1919, has been appointed by President Calvert Townley, of the Institute.

The members of the committee are: Donald McNicol, chairman, and Messrs. O. B. Blackwell, R. E. Chetwood, E. H. Colpitts, H. W. Drake, W. B. Kouwenhoven, L. F. Morehouse, R. W. Osborne, W. O. Pennell, L. M. Potts, S. A. Rhodes, A. B. Smith, D. M. Therrell, W. H. Winter and D. E. Wiseman.

The October meeting of the Institute will be a joint meeting with the Institute of Radio Engineers, to be held in New York, October 1, at which time will be presented three important papers on the subjects of telephony and radio telegraphy.

IN THE YEAR 1816, Ronalds, in England, observed that an electric impulse would probably encounter retardation in a long underground or submarine conductor. His ideas on this subject could not have been very clear as the difficulties he experienced were with an underground wire but 525 feet in length, and retardation as later understood was not successfully investigated until seven years later, by Faraday.

## Telephone Rates in Pennsylvania.

The Public Service Commission on August 16, notified The Bell Telephone Company of Pennsylvania that an examination of its books and accounts would be made in connection with its application to establish as the legal rates in Pennsylvania the rates made effective by the Postmaster General of the United States and now being collected. The recent Act of Congress returning the telephone companies to private control and ownership on August first, 1919, provided that the rates determined by the Postmaster General should remain in full force and effect for a period of four months thereafter, or December first, 1919. A public hearing was held by the Commission in its offices in the Capitol at Harrisburg on September 17, at which time The Bell Telephone Company presented evidence supporting its petition to have the present federal rates made the legal rates in the state of Pennsylvania, and in order to have all the information available before it to determine whether or not those rates are reasonable and just, the Commission will make an examination of the books and records of the company.

## The Telephone Society, Incorporated.

Announcement has been made of the consolidation of the Telephone Club, Inc., and the Telephone Society, Inc., both of New York City. The 15,000 employees of the Bell system in and around New York have been invited to become members of the new Society. All male employees of the New York Telephone Co., American Telephone and Telegraph Co., Western Electric Co., Empire City Subway Co., or of any local affiliated company are elgible for membership.

The Society has its headquarters in the club house at 353 West 17th St., and the officers are: H. W. Casler, president; F. E. Congdon, vice-president; E. A. Gurnee, treasurer; J. D. Newman, secretary. Representing New York Telephone Co. employees on the Executive Committee, are: P. D. Honeyman, I. J. Thorp, H. J. Schulz and A. J. Norman; American Telephone and Telegraph Co., O. B. Blackwell and L. R. Jenney; Western Electric Co., F. H. Legett and E. P. Clifford.

## Submarine Cable Testing.

We have received a supply of "Darby and Fisher's Students' Guide to Submarine Cable Testing," fifth edition, one of the most popular books on this important subject.

The book contains 240 pages and deals with all tests and measurements made in modern submarine cable practice. An appendix is included which contains answers to all questions presented in the main work.

The price of the book is $4.50 and copies may be had from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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## INDUSTRIAL.

H. J. McNAMEE, for many years assistant to W. S. Hallett, superintendent of supplies, Postal Telegraph-Cable Co., New York, is now associated with the American Jobbers Supply Co., 233 Broadway, New York, as sales engineer. Mr. McNamee is thoroughly familiar with all matters pertaining to telegraph and telephone supplies and pole line construction materials, and his connection with the American Jobbers Supply Co., has greatly strengthened the sales organization of that company.

THE PRESENT large amount of telegraph line construction under way by the commercial telegraph companies has made serious inroads upon the stocks of glass insulators maintained by the various insulator manufacturers. The Hemingray Glass Company, of Covington, Ky., report a large demand for their products.

THE ALTERNATING CURRENT TELEGRAPH SOUNDER, manufactured by J. H. Bunnell & Co., New York, has been improved in design so that the sounders now being supplied are meeting with universal success. The sounder operates on city alternating current power of any commercial frequency or voltage.

THE FRENCH BATTERY and CARBON CO., of Madison, Wis., manufacturers of dry cells report a wide and growing demand for their No. 6 Telephone dry battery. The former objection to the purchase of dry cells in quantities for stock—that shelf action was almost as wearing as service use—does not hold good in the case of the French Battery and Carbon Company's cell with protective coating. The coating prevents shelf deterioration.

KARL G. ROEBLING, president of the John A. Roebling's Sons Company, Trenton, N. J., has been elected a director of the American Ship and Commerce Corporation, New York.

### Single Line Repeater.

The single line telegraph repeater manufactured by the Jester-Cooper Company, Houston, Tex., is being used successfully on several large railroad systems and in commercial telegraph service.

The management of this repeater is as simple as that of an ordinary single relay and sounder set, with which all telegraph operators are familiar. No local battery is required in its operation.

FARRAR, in England, in the year 1851, made the statement: "If current power could be varied by some slight variations of a vibrator, to be affected by the atmosphere as the tympanum of the ear is, the supposition is that the sounds of the voice might be reproduced." The telephone was not invented by Bell until 1875.

THE WESTERN UNION TELEGRAPH COMPANY paid its first dividend in December, 1857.

### Western Union New Kansas City Office.

In the August 16 issue of TELEGRAPH AND TELEPHONE AGE was given an account of the disposition of floor space and office appointments of the new office at Kansas City, installed by the Western Union Telegraph Company.

OPERATING ROOM EQUIPMENT

Initially there will be ten 2-channel multiplex sets, three 3-channel and three 4-channel sets, 212 Morse positions, 58 telephone positions, 10 sections of main line and loop boards, 2 sections of time service boards, nine 13-foot repeater tables, 14 operating positions, together with equipment table and panel board for the commercial news department. The telegraph power plant is to be of the booster type. The emergency unit will consist of a 40 K. W. generator coupled to a six cylinder 80 H. P. kerosene engine.

THE BOARD OF RAILWAY COMMISSIONERS, of Canada, has approved the Marconi Wireless Telegraph Company of Canada's conditions for the acceptance of wireless telegrams via Canadian Pacific Railway Company's telegraphs, Great North Western Telegraph Company and Western Union Telegraph Company.

THE PUBLIC WORKS DEPARTMENT, of Canada, has submitted to the House of Commons supplementary estimates for the year ending March 31, 1920, covering the construction of new telegraph and telephone lines and reconstruction of present lines in Ontario, Nova Scotia, New Brunswick, Quebec, and British Columbia, to the extent of $97,111.

### Electrical Measurements and Meter Testing.

This is a plainly written book, by D. P. Moreton. The book is particularly valuable to the telegraph and telephone engineers, because it deals directly with the subjects with which they are particularly interested. The voltmeter and the ammeter are the instruments used in this line of work, and these are to be found in all modern offices. Price, $1.00 per copy. For sale by TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

### Books on Wireless.

TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York, is headquarters for all books on wireless telegraphy. Those desiring such books should send for our price list. We make it our business to fill all orders the same day they are received.

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# QUESTIONS AND ANSWERS

### Sleet on Wires.

A. R. L.—Sleet storms are more prevalent throughout the eastern states and in the mountain states of the Northwest than in other parts of the country. Hardly a winter passes without telegraph and telephone wires extending throughout the New England States being subjected to damage due to glaze gathering on the wires. During a heavy rain storm if the weather changes suddenly with lowering temperature the rain-water freezes around the wires, rapidly loading them with an excess of weight, causing the wires to break; sometimes pulling down the poles upon which the wires are supported.

Wind, rain, and varying temperature are the ingredients of a variety of troublesome storms. In the terminology of the weather bureau, these may be sleet storms, ice storms, or glaze. Officially "sleet" is known as small globules of rain frozen before striking the wires. When rain freezes after falling and forms a glassy surface around the wires the condition is called a glaze.

### Western Union and Wireless.

H. H. M.—Acceptance of messages at Western Union offices for transmission to ships at sea, was commenced on March 1, 1904. The announcement was contained in the *Journal of the Telegraph*, dated February 20, 1904. At that date there were three Marconi stations on the American Atlantic coast, namely, Sagaponack, N. Y., Babylon, N. Y.; and Siasconset, Mass., and thirty-two trans-Atlantic steamships were equipped with Marconi apparatus.

### Aurora Borealis.

G. R. F.—The phenomenon of aurora borealis is of considerable concern to telegraph and telephone wire chiefs, due to the electrical disturbances which generally accommpany these aerial displays. Benjamin Franklin, the first electrical scientist of America, had a theory to account for the aurora borealis, or Northern lights, as the phenomena are sometimes named. Franklin's theory was that the aurora is due to electrical discharges in the upper air as a consequence of difference of electric potential between the cold air of the polar regions and the warmer streams of air and vapor raised from the level of the ocean in tropical regions by the heat of the sun.

Of recent theories advanced, those of Professor Birkeland, of Norway, and Professor Arrhenius, of Sweden, have gained wide acceptance. In the main the theories of both these scientists point to the conclusion that electric corpuscles from the sun are attracted to the earth by the earth's magnetic poles, giving rise to vortices or whirlpools of electric current in the upper strata of the atmosphere.

The connection between the simultaneous occurence of aurora disturbances and sun spots is accounted for by the rapid expansion of gases as they approach the sun's surface from within, resulting in rapid cooling, which explains the comparatively low temperature in sun spots, and the formation of such solids as titanium oxid and the hydrids of calcium and magnesium. These dissimilar substances it is believed give rise to the magnetic field which is known to be a feature of sun spots.

### Resonance.

W. R. W.—With inductance and capacity present in a circuit, and connected in series, the current in the circuit may be determined by the formula:

$$I = \frac{E}{L \times p - \frac{1}{c \times p}}$$

where c represents the capacity in farads; L, the inductance in henries; E, the applied electromotive force, and p, the reactance factor, or, $2\pi n$, n being the frequency in cycles per second.

A coil having an inductance of 0. 703 henry, connected in series with a condenser of capacity $\frac{1}{100{,}000}$ farad, and supplied from a 60-cycle source, will constitute a circuit that is in resonance; that is, the current in the circuit will be a maximum from the existing voltage.

### Radio Apparatus.

W. M. P.—The sum of thirty-five dollars will purchase a very good amateur radio receiving outfit If you desire to possess a standard cabinet radio set you can purchase a short-wave regenerative set for wave-lengths from 170 to 580 meters for $46.00. An audion cabinet with switches and resistance unit may be purchased for $11.00.

### Radio Aerial.

W. C. M.—A four wire radio aerial one hundred feet in length is more efficient than a single horizontal wire four hundred feet in length. Increasing the number of wires increases the electrostatic capacity of the aerial, reduces the total inductance, and lessens the resistance of the aerial to high frequency currents.

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# Electro-Physics for the Telegraph, Telephone and Radio Student

No. 12.

### HARMONICS.

It is but a short step from direct-current conditions to alternating current conditions in electric circuits. The fundamental note, swing or oscillation of a system capable of rhythmical motion or change is the one which fits in with the formula giving the time period of the system in terms of those of its properties which affect that period. Thus in an electrically oscillating circuit the time period is fixed by the amount of inductance, capacity, and resistance of the circuit, and the fundamental wave of such a circuit would be a wave of that time period.

The current flowing in a circuit supplied with power from an alternating current source is equal to the electromotive force in volts divided by the impedance.

The value of the impedance may be arrived at by means of any one of the following formulas. Four are given because the student may in studying textbooks encounter any one of these, and it is well to have them all in one place so that it may be understood that the same result may be obtained in various ways.

$$\text{Impedance in ohms} = \sqrt{4\pi^2 n^2 L^2 + R^2}$$

$$= \sqrt{L^2 p^2 + R^2}$$

$$= \sqrt{Reactance^2 + R^2}$$

$$= \sqrt{R^2 + \left(\frac{1}{cp}\right)^2}$$

where L represents the inductance in henries; R, resistance in ohms; p, $2\pi n$; n, frequency in cycles; $\pi$, 3.1416, and c, capacity in farads.

In radio engineering, telephone engineering, and high tension electric power line work mention is frequently made of upper and lower harmonics; that is, upper and lower harmonics of the fundamenal wave.

The frequency of the first upper harmonic is equivalent to $2 \times n$, the frequency of the second harmonic to $3 \times n$, and of the third harmonic to $4 \times n$. Consider, for instance the case of radio waves: A station transmitting on a 2,500 meter fundamental wave may be heard on the first upper harmonic or on a wave length of one-half this value. Of course, ordinarily the fundamental wave of the transmitter produces the strongest signal.

The harmonics below fundamental have a frequency, for the first lower of $n \times \frac{1}{2}$; the second lower, $n \times$ 1-3, and so on. The harmonics which are lower than the fundamental produce wave lengths which are proportionately altered in length.

### EFFECTS OF HARMONICS UPON ACOUSTIC QUALITY

Some time ago at the Bureau of Standards in Washington was set up an outfit of generators known as a harmonic set. The set consists of two driving motors and eight three-phase generators, which, at normal speed give frequencies of 60, 180, 300, 420, 540, 660, 780, and 900 cycles per second.

They are assembled in two sections, the generators with the three lower frequencies being mounted on the shaft of one motor, while the others are mounted with the second motor. The two sections can be coupled rigidly together when desired. Each generator has rotating poles and stationary armatures, and the position of the armature can be shifted by means of a worm gear and hand wheel. By connecting the generators in series, and properly exciting the fields and setting the armatures,


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any odd harmonic up to the fifteenth can be superposed upon the fundamental frequency in any amplitude and phase relation.

Determination directly made with these generators show that with 300 cycles, the possible overtones have frequencies of 900, 1,500, 2,100, etc. The frequency of 900 cycles is common to both, and with shifting phase these components will at times oppose, at other times reinforce, each other, thus changing the amplitude of this component of the combination.

When separate telephone receivers were placed in circuit with generators having different frequencies, and the telephone placed inside the body of a mandolin to act as a sounding board and combine the sounds, very distinct changes were noted, often for more than one period. They could not be made to disappear by any arrangement of intensities, not even to decrease materially. Evidently these changes of tone were chiefly due to the harmonics introduced by the sounding board, as might have been expected.

## SHOP TALK.

### Economy at Requisition Time.

BY THE OBSERVER.

In a previous article the writer called attention to the large amount of money spent annually which need not have been spent had all of us exercised the same care with the company's property as we do with the things we buy for ourselves with our own money. Where the amount of property and equipment is as large as it is in the operation of telegraph companies, there is a tendency on the part of the average employee to disregard the money value of the tools he does his work with.

It is only by virtue of the large money value of the plant that large savings are possible. For instance, if you were foreman of a peanut stand and in your eagerness to close up on time dropped a sack of peanuts on the whistle, the firm would be out only a dime or two; but if the firm owned and operated ten thousand peanut stands, and ten thousand foreman in their eagerness to close up on time dropped sacks of peanuts on ten thousand whistles, the firm would be out ten thousand, or twenty thousand dimes. It makes some difference doesn't it?

Consider the making of requisitions! It is often the procedure to go through the catalog and order everything that is thought may possibly be needed; or rather, everything that is thought will be allowed. Now the main purpose of that useful book is to acquaint employees with the instruments, accessories and materials which are carried in stock, so that when a real need exists for any particular thing it may be learned whether or not the same is carried on hand. The fact that a certain article is illustrated or listed in the catalog of supplies carried in stock is, no more reason for ordering it than if you happened to notice the same article in a shop window in your own town. It will cost practically the same amount of money whether shipped from headquarters or purchased locally.

The supply catalog is instructive in that it acquaints the employee with approved methods of classifying the articles required in service. When requisitions are made out in an orderly manner it is much easier for supply department employees to select the various items from stock.

Do not begin by listing on a sheet certain sizes of screws, and then fill up the remainder of that sheet with such items as lamps and tool sashes if there is likelihood of your adding an item for other sizes of screws in the middle of the second sheet. The proper way to fill out the requisition form is to follow alphabetically the articles as listed in the catalog.

Good judgment in the matter of ordering material will show up to your credit; sometimes when you might least expect credit from that source.

It is wrong, of course, to neglect to order supplies that are necessary hoping to be able to borrow from some other office when you are short. This is not only poor judgment, but it is poor economy.

It is a good idea to keep a permanent memorandum of articles needed, so that when requisition time comes you may quickly fill out the form for everything actually needed, and so that you will not have to study the pages of the catalog searching for things that might be useful.

When articles are received for which there is no immediate or prospective need, notify the general office to this effect, stating exactly the nature of the article or material on hand as surplus, so that it may be used elsewhere.

In the service of a telegraph company ten thousand employees can each day do somethng to save the company a dime. Figure up what that would amount to in a year, and keep in mind that the present disposition of the management is to hand back to us a big share of what we can save by forethought and economy.

### New Book on Radio Telegraphy.

"Principles of Radio Telegraphy," is the name of a new book by C. M. Jansky, which covers the latest practice in radio engineering. The book contains 237 pages and has 179 illustrations.

The first four chapters deal with elementary electrical engineering as applied to radio work, and the remaining seven chapters go thoroughly into the subjects of electromagnetic waves, alternating currents, oscillatory circuits, radio circuits, practical transmitting appliances and methods, practical receiving appliances and methods, and vacuum tubes and their use in wireless telegraphy.

We recommend this fine work to all who are studying or who intend taking up the study of radio signaling.

The price of the book is $2.00 and copies may be purchased from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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## Electric Wiring in Telegraph Offices.

BY JOHN H. MAYER, NEW YORK.

The various telegraph companies and the Telegraph and Telephone Division of the American Railroad Association have rules governing the installation and wiring of electrical apparatus making up the equipment of telegraph and telephone offices, and the installer and wireman are expected to live up to the rules.

In some cases workmen before being sent out on regular installation work are given a course of schooling in the class of work they are required to do. The amount of detail information that may be embodied in a general rule necessarily is limited, and the conditions met with in different cases vary so widely that it does not seem possible to cover all possible conditions by means of general rules.

It is true also that however explicit a rule may be much still depends upon the workmen's experience and judgment. No amount of written explanation will post a man as to the proper method of paring insulation from a wire so that he will avoid injuring the conductor. This must be acquired through actual practice.

In connecting up a wire to a binding-screw or locknut post the insulation, if drawn up too close, is liable to work under the screw head, nut, or washer, and cause a faulty electrical contact. This may be avoided by leaving about one-eighth of an inch of bare wire exposed after the connection is made. In a soldered connection the insulation, if drawn up too close to the point where the solder is to be applied, interferes considerably with the soldering process.

Tightening binding-screws and nuts must be done in a manner to insure good, solid contact; but excessive strain applied to the screw or nut may strip the threads or twist off the stem. Experience, if thoughtful, teaches a man doing this kind of work to know just when a nut or screw is tight enough.

Sometimes two nuts are used on a single post, the purpose of the upper, or outside nut being to lock, or secure the inner nut from working loose. A separation should be maintained between the two nuts so that the locknut may be tightened after the inner nut has been tightened. When both nuts are made up at the same time the locknut does not serve its intended purpose. Binding posts often are equipped with washers between which the wires are supposed to be placed. In this way a wire is protected against injury which might result from being in direct contact with the under surface of a screw head or nut when the screw or nut is being made up.

### RUNNING WIRES ALONG WALLS

In running single, or twisted wires along walls or ceilings, it is required that loom or porcelain tubes be used to get over or around obstructions. If the loom or tube is just slipped over the wire and not secured at the desired point by tapping fast to the wire, or otherwise, it is liable to shift its position and fail to fulfill its purpose.

When running lead-covered cables care must be exercised to guard against kinks or bends that are too sharp, as these are liable to result in the breaking of the lead sheath. Broken or fractured sheath permits moisture to enter the cable with a resulting breakdown of insulation of the conductors.

The foregoing and many other details, some of which are covered by rules can be fully understood and the workman's "knack" acquired only after more or less experience with the work. Foremen, and the older workmen, if properly disposed can materially assist a less experienced workman to acquire the knowledge of detail which is essential in the turning out of work that will agree with the rules and meet with approval.

Due to a lack of knowledge as to the reason for a given rule, and in cases where it is thought that the completed job is not likely to be given thorough and competent inspection, a wireman is sometimes disposed to observe a rule indifferently. Again, a workman whose duties consist of installation work only, and who is not likely to later be concerned with the clearing of trouble in the circuits of the installation, is not likely to view his workmanship from the trouble-hunter's standpoint. As a consequence installation work is often done in a manner that makes for trouble, or at least causes trouble-hunting to be more tedious and time consuming than should be necessary.

### SYSTEMATIC SCHOOLING ADVISABLE

The situation, viewed as a whole, would seem to warrant the most thorough schooling practicable in this very important class of work. An understanding of the reason for the rule as well as a knowledge of the rule itself would, no doubt, make it plain to a man why he should do good work. Careful and workmanlike habits encouraged in workmen will in large measure make up for unavoidable deficiencies in rules and regulations.

## Submarine Cable Working.

"Beginner's Manual of Submarine Cable Testing and Working," by G. M. Baines, is a book of 265 pages dealing in a thorough manner with the operation of submarine telegraphs.

The first four chapters contain elementary matter relating to batteries, electrical laws, etc. Chapter V. covers copper resistance of cable, instrumental zero, false zero, theory of false zero test; and in the following eighteen chapters up to date matter is incorporated explaining cable insulation tests, inductive capacity of cables, tests for broken cables, curb transmitter, mouse mill device, recorder adjustment and other matter which should form a part of every cable man's technical knowledge.

The price of the book is $4.50, and copies may be obtained from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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## OBITUARY.

HENRY A. REED, aged ninety years, a forty-niner of the telegraph, died at his home, Newark, N. J., August 23. Mr. Reed who was president of the Bishop Gutta Percha Company of New York, was born at Carmel, N. Y., and learned telegraphy at that place in 1848. In 1850 Mr. Reed opened the first telegraph office on the Harlem Railroad. Mr. Reed was manager of the Poughkeepsie, N. Y., office for a number of years and one of his frequent visitors was Samuel F. B. Morse, the inventor of the telegraph, who resided in that city. In the early seventies he became identified with the Bishop Gutta Percha Company, pioneer manufacturers of insulated wire and cables, with which he had been identified until the time of his death. For the past ten years, on account of advancing age, Mr. Reed had not been active in business circles, his interests being taken care of by his three sons. Mr. Reed was one of the organizers of the Electric Club of New York and he exhibited the first phonograph made by Thomas A. Edison. He was also identified with many telegraph and electrical associations. He is survived by his wife, three sons and a daughter.

A. H. STEWART, aged seventy-one years, until recently manager of the Western Union office at Nashville, Tenn., died in that city August 17. Mr Stewart has been identified with the Nashville office nearly fifty years as operator, chief operator and as manager.

ROBERT MARSHALL, an operator in the service of the Western Union Telegraph Co., at 24 Walker St., New York, died on August 16. Mr. Marshall met with an automobile accident in July and had been laid up since that time.

JAMES BRICK, sixty-four years of age, died at Clifton, N. J., August 17. Mr. Brick, early in life was agent and telegrapher in the service of the Erie Railroad Company.

F. R. JOHNSON, during the past five years in charge of the telegraph department in the New York *Evening Sun* office, died at his home in Brooklyn on July 13, after a brief illness.

### Telegraph and Telephone Life Insurance Association.

Assessments Nos. 661 and 662 have been levied by the Telegraph and Telephone Life Insurance Association to meet the claims arising from the deaths of James H. Badcock, Pittsburg, Pa.; Titus A. Brooks, Knoxville, Tenn.; Chas. J. Trockelman, Long Island City; Chas. W. Moore, Omaha, Nebr.; John F. Vollrath, Philadelphia; A. L. Hartley, Lexington, S. C.; Harry T. Parkinson, Oakland, Calif.; Harry A. Tuttle, Minneapolis, Minn.; Phoebe Osborne, Rushville, Ind.; George W. Dearborn, Amberst, Va.; A. O. Hedlund, Prentice, Wis; and C. C. Stanley, Syracuse, N. Y.

### Death of Robert Hearne.

Robert Hearne, superintendent of the Commercial Cable Company's station at Rockport, Mass., from 1884 until 1916, died at his home at Rye Beach, N. H., on August 17. He was born at Limerick, Ireland, in the year 1852, and was retired in the year 1916 and placed on pension.

Mr Hearne was one of the best, and favorably known cable managers in the submarine cable service.

### Book on Alternating Currents.

Arithmetic of Alternating Currents, is the name of a new book by E. H. Crapper. For those who are familiar with elementary mathematics, this book will be found valuable as it describes in a thorough manner periodic and alternating currents; generation of alternating electromotive forces; inductances; inductive circuits; capacity and condensers; resistance, inductance and capacity in parallel; static transformers; induction motors and transformation of currents.

The book contains 208 pages. Price $1.25. Copies may be purchased from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.


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## The Good Old Days.

It is one of the paradoxes of life that young men lacking experience, or a profound knowledge of life are, as a rule, optimists, while older men view the happenings of their times as of direful portent.

This truism has perhaps obtained in all ages. The children in all ages have gamboled and frolicked until, each night, fatigue and darkness overcame them, while older folks at the same time gravely expressed fear that catastrophe was just topping the hill and soon would engulf humanity, making ruin of all.

Most of the apprehensive headwagging going on to-day is that done by those of us who have passed the meridian of life's span: youth has no fears for the future and is little disturbed by the colorful happenings of the day.

And youth is right. When those who are now old were young, they were right in accommodating themselves to the constantly and rapidly changing conditions then experienced. As men grow old they look for serenity—for peace and quietness, but the daily press brings to them, seemingly, nothing save accounts of heedless and reckless activities of individuals bent upon rending the fabric of society.

Expressions one often hears emanating from the armchairs around the chimney corner refer to "the good old days." The good old days! When could they have been? Was it the period, say, from the close of the civil war until 1890? In that period there were no Big Four to wield a big stick: there were no Bolsheviks, known as such; there were no soulless corporations, and there was no League of Nations begging for ratification.

But, let us, for a moment, recall some of the events which the newspapers of those days played up in headlines.

Let us start ten years after the civil war closed, to get away from its immediate reconstruction period.

In January, 1874, it required the presence of United States troops in the Louisiana State House at New Orleans to protect the convening of the Legislature. In 1875 the chief clerk of the United States treasury, and the President's secretary were indicted for complicity in whiskey frauds in the west. In 1876 the Secretary of War was arrested for accepting money in consideration of appointments to office. In that same year the Sioux Indians massacred 305 officers and men of General Custer's command. In 1877 eleven "Molly Maguires" were hung at Pottsville, Pa., for murder; and in that year a railroad strike occurred which necessitated the calling out of State and Federal troops in five states, 200 lives being lost in Pittsburg, 125 locomotives destroyed and 3,500 railroad cars burned. In 1878 a yellow fever epidemic in New Orleans claimed 4,000 lives, and in the same year a big savings bank in New York was robbed by burglars who carried away about $3,000,000. In 1881 an assistant Postmaster General had to resign on account of "Star Route" mail frauds. In 1882 the Government had to take steps to prohibit polygamy, and in the West Jesse James was doing a Villa act. In 1884 at Cincinnati, Ohio, there was a three days' reign of mob rule and terror, as a result of an unpopular jury decision. The jail and courthouse were wrecked, and after the affair had ended forty-two dead and 120 wounded were counted. In 1885 a mob at Rock Springs, Wyo., massacred fifty Chinamen. In 1888 the Knights of Labor started business and for a time tied up half the railroads of the country; and in Chicago, in that year, it was found necessary to hang eight anarchists.

The foregoing incidents are only a few of the happenings which the daily papers chronicled in "the good old days."

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# CURRENT EVENTS

## EXECUTIVE OFFICE ANNOUNCEMENTS, PERSONAL MENTION, APPOINTMENTS

### PERSONAL.

JOHN GELL, inventor of a successful tape perforating machine for automatic telegraphs, and of various other telegraph systems and devices, was in New York and Washington during the month of August in connection with additional patents which he is taking out in this country.

JOHN H. BELL, engineer in the telegraph division, Western Electric Company, New York, is preparing a comprehensive paper on the subject of printing telegraph systems to be presented at a meeting of the American Institute of Electrical Engineers in the near future.

GEORGE M. EITEMILLER, the veteran telegraph wire chief, who during the past year has been in Denver and other Colorado terminal offices of the Western Union Telegraph Company, was a New York visitor during the last week of August.

### WESTERN UNION TELEGRAPH COMPANY.

NEWCOMB CARLTON, president, after a ten days' trip on the road returned to his office September 15.

LEWIS MCKISICK, assistant to the president, started on his annual vacation September 5. He is spending the time in Colorado.

GEORGE M. YORKE, vice-president in charge of plant and engineering, spent his vacation this year at his cottage at Point Pleasant, N. J.

F. E. D'HUMY, central office engineer, started on his vacation September 5. With his family he is spending the time in Vermont.

THE NEW CABLE STATION BUILDINGS which the company is erecting at Miami, Fla., to take care of the Miami end of the new Barbados submarine cable are nearing completion.

MISS O'FLANNAGAN, secretary to President Newcomb Carlton, has returned from her summer vacation.

J. L. FERCIOT, manager at Omaha, Neb., has been advanced to the position of division commercial manager of the Central Division, with headquarters at Omaha.

W. W. ACUFF has been appointed manager at Nashville, Tenn., succeeding A. H. Stewart, deceased. Mr. Acuff is twenty-five years of age. He entered the service as messengr at Knoxville, Tenn., and has worked up through the various grades of the service, serving during the past year as chief clerk to the manager at Nashville, and prior to his recent promotion was assistant manager.

THE COMPANY is planning extensive improvements in its operating plant at Columbia, S. C.

THE DENVER OFFICE of this company is now handling an average of 60,000 messages per day.

### POSTAL TELEGRAPH-CABLE COMPANY.

NEW YORK MAIN OFFICE chief operators who have recently returned from their annual vacations include, Frank E. McKiernan, general quadruplex chief; R. E. Walsh, western traffic chief; L. H. Boone, assistant chief operator; George A. Mitchell, assistant loop chief, and Arthur F. Kavanaugh, chief clerk of the service department.

CHARLES WEYDMAN, chief operator of the main office Buffalo, N. Y., has resigned from the service on account of ill health. Mr. Weydman has been employed in the Buffalo office thirty years.

G. P. WYCKOFF has been appointed chief operator of the Buffalo, N. Y., main office.

J. A. KELLER has been appointed general traffic chief of the Buffalo, N. Y., main office.

J. D. PROSSER has been appointed chief operator at Birmingham, Ala. Mr. Prosser was formerly in the service but has been engaged in another line of work the past few years.

W. H. JACKSON, formerly chief clerk in the office of Superintendent Lloyd, and who has been out of Postal service the past six months, has been appointed night traffic chief in the Birmingham, Ala., office.

A. M. LININGSTON has been appointed assistant traffic chief in the Birmingham, Ala., office. For some time he has been employed as an operator in that office.

MANAGERS APPOINTED: B. B. Washburn, Grand Island, Neb.; F. E. Wallace, Fresno, Cal.; C. E. Wells, Fredericksburg, Va.; A. H. Weir, Columbia,

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Tenn.; Nellie Donegan, stock yards branch, Sioux City, Ia.; S. Spidle, Columbus, Neb.; E. H. Plouff, Menominee, Mich. C. B. Shoemaker, Penn Yan, N. Y.; J. A. Meseley, Thomasville, Ala., and W. C. Paris, Dyersburg, Tenn.

### Indianapolis, Ind., Postal Notes.

JOHN F. LOONEY, superintendent, has returned from a week's trip over his district.

E. F. DUNN, traffic chief, while on his summer vacation visited Detroit and Buffalo.

FRANK SPOONER, chief operator, has been a busy official since the wires were released from Government control, moving the growing volume of traffic which passes through this office.

CARL EDER, working the Chicago bonus circuit in this office, has returned from his vacation which he spent taking an automobile trip.

### Kansas City Postal.

The present main operating department chief operators in this office are: T. W. Ingram, chief operator; Frank J. Wallace, assistant chief operator; Charles Falk, night chief operator; H. B. Moling, all night chief operator; P. C. Strauss, night wire chief; J. L. Ingram, traffic chief; Bruce Dietrich, assistant traffic chief, and Messrs. McKenzie and McIninch, quad chiefs.

The departure of Bryant W. Fields, after twenty-six years' service in this office, for San Francisco to accept a position with General Superintendent A. B. Richards of the Pacific Division, although felt as a positive loss to this office, is regarded as due recognition of Mr. Fields' ability as an operating official and technical expert.

BRYANT W. FIELDS, for many years assistant chief operator of the main operating department, Kansas City, Mo., has been transferred to San Francisco. General Superintendent A. B. Richards, of the Pacific Division, long connected with the Kansas City office as manager and superintendent, early recognized Mr. Fields' ability as an electrician and at every opportunity advanced him to more responsible positions, and his transfer now to San Francisco is a reward for years of study to advance his knowledge of the technical side of the business.

### New York Western Union.

H. M. HEFFNER, assistant chief operator, Commercial News Department, has returned from his vacation.

MISS PEARL MCCANN, of the Commercial News Department, has gone to California for three months.

THE WESTERN UNION EMPLOYEES ASSOCIATION held an entertainment and dance on September 16 in the Ladies' Rest Room at 24 Walker Street.

PHILIP JACOBS of the testing and regulating department, 24 Walker Street, and Miss Rose Wander were married on August 10.

THIRD DISTRICT: N. W. Jacobs, formerly manager of "Mf" office has been appointed district delivery supervisor.

FOURTH DISTRICT: John Donovan, Miss O'Grady and Miss Buckley, of District Commercial Superintendent M. J. Hayden's office, have returned from their annual vacations.

EDDIE DERR, of the Brooklyn *Eagle* office, in charge of the press wire, spent his annual vacation at Allentown, Pa.

A. GERMINO, clerk of the 313 Fulton Street, Brooklyn office, has been transfered to the 4706 Third Avenue office.

J. J. MCKILLEN, formerly of the Camp Upton office, has been transferred to the Southampton, L. I., office, vice Miss H. Nurick returned to New York main office.

A. W. CHERMAK, formerly night manager of the 313 Fulton Street, Brooklyn office, has been promoted to manager of the 1268 Bedford Avenue office, vice I. Tannenbaum transfered to New York main office.

M. R. SCHWARTZ, has been appointed manager at West Brighton, Staten Island.

R. F. MURPHY, division vice-president, Association of Western Union Employees; Thomas J. Smith, and L. P. Tebeau, delegates to the annual convention of the Association at Denver, Colo., left New York on August 28.

T. ENGSET, secretary general of the Administration of Telegraphs of Norway, who is in this country investigating telegraph, telephone and radio systems with a view to making recommendations for the adoption of new systems in Norway, has been much interested in printing telegraph developments here. He was shown over the Western Union's extensive automatic plant by Louis Casper, of Vice-President Fashbaugh's office.

### Chicago Western Union.

H. E. RAWSON, chief operator, Columbus, Ohio, was a recent visitor in Chicago. He was visiting relatives in the city.

C. E. WILLOUGHBY was recently appointed assistant chief operator in charge of the inspection of automatic operating practices.

A. J. FULLER has been appointed assistant chief operator in charge of automatics to succeed C. E. Willoughby.

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H. E. STEINBRENNER has recently returned from Berlin and resumed his position in the Chicago office as automatic attendant. As a member of the A. E. F., "Stiney" spent considerable time in the army of occupation and was called upon to make trips to Berlin.

THE CHICAGO office recently received a brief visit from W. N. Fashbaugh, vice president in charge of traffic.

W. F. WEBBER, wire chief, in charge of the Chicago Testing and Regulating Department, is absent on his vacation.

E. F. WACH, editor of *The Telegraph World*, is attending the convention of the Association of Western Union Employees at Denver.

F. A. GRASER, chief clerk to Division Traffic Superintendent J. J. Welch, is spending his vacation in the Wisconsin woods.

**General Manager T. W. Carroll's Conception of the Essential Features of a Dependable and Efficient Telegraph Service:**

1. Clean and orderly offices.
2. Neat, clean and courteous messenger boys.
3. Courtesy in dealing with the public.
4. Prompt response to telephone calls—commercial and traffic.
5. Prompt response to messenger circuit calls.
6. Prompt delivery of telegrams by telephone and messenger.
7. A fast and accurate wire service.
8. Prompt installation of call boxes.
9. Prompt installation of time service.
10. Prompt acknowledgment of all letters.
11. Immediate and complete information on all complaints.
12. Active and aggressive solicitation.
13. Correct and neat bills mailed promptly each month.
14. Prompt settlement of all accounts.
15. Follow-up system on all delinquents.
16. Prompt adjustment of all differences bebween the patron and the Company on bills.
17. Careful selection of employees and assignment to duty made in accordance with their capabilities.
18. Strict compliance with all bulletins.
19. Co-operation with all other departments.

CARBON and electrolytic solutions when heated have their resistance lowered while metals have their resistance increased when they are heated.

Talk is cheap and so are Thrift Stamps, but the similarity ends there.

## THE CABLE.

### Cableship Takes on Cargo of Grain.

The cableship *Faraday* on August 25 was loaded at Montreal, Que., with a cargo of grain for a British port. The *Faraday* has been in the cable laying and repairing service continuously during the past twenty years and has laid a large proportion of the long distance submarine cables throughout the world.

During the late war the *Faraday* was engaged in cable laying between Ireland and Newfoundland, when she was attended by a British cruiser and a number of patrol boats.

It may be that the old cableship, having always left home with her tanks full of cable and returned empty, has scruples now about returning to Old England without bringing home all she can carry of Canada's excess stores of provender.

### New Submarine Cable Plant.

Announcement has been made that the Western Electric Company has purchased a tract of fifty-five acres near Norfolk, Va., as a sight for a new manufacturing plant. Submarine cable will be the chief product of this plant. The water frontage is such that cable boats drawing thirty-five feet may be loaded at the docks. Construction is to be started within a few weeks.

### Cable Staff Changes.

PACIFIC CABLE BOARD: F. J. Reitz to Suva; A. J. Godwin to Fanning, A. C. Moginie to Auckland.

EASTERN EXTENSION TELEGRAPH COMPANY: F. G. D. Bourke to Perth; T. A. Jose, D. C. Phillips, D. W. Townley, D. Alexander, and H. A. Baxter to Singapore; H. S. Leggatt and J. Winterbottom to Cape St. James; R. N. Gordon to Penang; G. H. K. LaNauze to Hong Kong, and P. T. Chilvers to Shanghai.

WESTERN TELEGRAPH COMPANY: H. W. Johnson, R. C. Hasell, N. K. Pearce, and C. N. Webber to Madeira; H. S. Sutton, P. B. Noble, R. George, and E. W. Robertson to Rio de Janeiro; R. W. Carter to Buenos Aires.

EASTERN TELEGRAPH COMPANY: G. J. Hyde to Durban; G. E. Alexander, and S. W. Woollett to Alexandria; V. E. Page, W. Polgreen and E. J. Northey to Marseilles; C. W. Gunner to Ascension; L. F. Caine, R. P. M. Hill, B. R. Irving, H. F. Wheelock, P. W. E. Hyde, F. G. W. Smails and R. D. Farr to Gibraltar; G. W. Doughty, C. Vaughan, G. C. A. Williamson, D. R. Nash and F. B. Stephens to Aden, N. S. Mills, E. N. Cox and E. E. B. Brown, R. V. Middleton, C. R. Cox and E. E. Wright to Zanzibar; S. G. Roddis and I. Gibson to Malta; E. H. Wilcockson and D. B. E. Lush to Fayal.

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## THE TELEPHONE.

THE PACIFIC TELEPHONE AND TELEGRAPH COMPANY had in operation, on July 1, 1919, 706,842 telephone stations, an increase of 26,137 since January 1, 1919.

C. E. YOST, president of the Nebraska Telephone Company, the Iowa Telephone Company, and the Northwestern Telephone Company, has resigned from the presidency of the three companies and has been made chairman of the board. He was succeeded as president by W. B. T. Belt, heretofore vice-president.

A. W. SCHUSSMAN, recently returned from service in the Signal Corps, overseas, has reentered the service of the Pacific Telephone and Telegraph Company as wire chief at Palouse, Wash.

ALFRED AVERY, wire chief for the Pacific Telephone and Telegraph Company at Colfax, Wash., has been transferred to the district plant chief's office at Spokane, Wash.

CHARLES E. MASON, general superintendent of the Southern California Telephone Company, has resigned his connection with the telephone company and has started a commercial enterprise of his own in Fresno, Cal.

TELEPHONES for the devastated regions of France are being provided by the French post office from equipment purchased from the American army authorities, which includes 273 exchanges, 25,000 instruments and many thousand miles of wire.

### New York Telephone Company Reduces Rates.

An 8 per cent. reduction on all charges for telephone service to business houses and residences in New York City, effective October 1, has been made by the New York Telephone Company.

In order to catch up with construction work which got behind during the war the company is carrying on new work to the extent of nearly a million dollars per month; the present programme involves the expenditure of $26,000,000. It includes six new central offices, two each in Manhattan, Brooklyn and the Bronx; additions to five other central office buildings; five complete new switchboards, four in Manhattan and one in Queens; additions in thirteen other switchboards, and the laying of 255,966 miles of wire. 10,000 telephones are connected to each exchange.

Buying War Savings Stamps is profitabe patriotism.

Howdy! Have you bought your Thrift Stamp today?

## RADIO TELEGRAPHY.

### Marconi Notes.

E. J. NALLY, vice-president and general manager, returned from Europe on the S. S. *Aquitania* recently.

C. J. ROSS, comptroller, spent his vacation at the Thousand Islands.

H. M. SHORT, depot superintendent for the English Marconi Company, spent his vacation at Quogue, L. I.

E. E. BUCHER, director Marconi Institute, has returned from his vacation at Asbury Park and the Adirondacks.

DAVID SARNOFF has returned from a business trip to Boston.

EUGENE STALINGER, chief engineer, Radio Department of Posts and Telegraphs, Warsaw, accompanid by T. B. Zwolinski, as interpreter, has arrived in this country, for the purpose of investigating radio, also telegraph and telephone conditions, having in view improvement of communication conditions in Poland.

SINCE the return of ships to the American Merchant Marine, the business of the Marconi Company has increased by leaps and bounds, making it necessary for the men to work nights and Sundays.

JOHN R. IRWIN, one of the early wireless operators and experts, and who was the radio man selected to accompany Walter Wellman in the first attempted trans-Atlantic aerial excursion, is now a member of the technical staff of the Wireless Improvement Company, New York.

FREDERICK S. DELLENBAUGH, who during the war was a captain in the Signal Corps in overseas service has been appointed an instructor in electrical engineering at the Massachusetts Institute of Technology.

THE WESTERN ELECTRIC COMPANY has on its New York engineering staff a large number of radio engineers. The following named radio engineers are in the service of that company: William C. Carpenter, Charles W. Newell, J. S. Jammer, F. S. Bernhard, M. K. Akers, J. E. Crites, R. W. King, J. F. Farrington, L. W. Wickersheim, A. R. Wimpfheimer and R. V. L. Hartley.

IT IS REPORTED from Ottawa, Canada, that the government proposes building several long range radio telegraph stations in Yukon territory. A commercial wireless service has been established between Canada and Bermuda.

A SCHOOL for expert radio instruction is to be

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opened at Camp Vail, Little Silver, N. J. The site selected is the west aviation field. Several branches of instruction are to be conducted; lectures and laboratory work are to be offered. The institution will be known as the Specialists' Signal Corps School.

IN POLAND the government has under consideration plans for the establishment of a central, long range radio telegraph station to be located in the vicinity of the Polish capital. It is stated that German interests have tendered a bid covering the construction of the station at a price less than one fourth that of other European bids. American interests are now figuring on the proposed work.

## Belgian Heroine Smashed Wireless To Balk Germans.

MLLE. GOMBIER, WHO NEARLY SUFFERED FATE OF EDITH CAVELL, REACHES NEW YORK ON STEAMSHIP LA LORRAINE

Mlle. Marie Louise Gombier, a twenty-one year old Belgian heroine who escaped the fate of Edith Cavell at the hands of the German invaders in Belgium, was one of the 579 passengers who arrived in New York recently on the French line steamship *La Lorraine* from Havre. She was wearing the French War Cross with two palms. Through adoption by Mrs. Lita Dowdy, a Y. W. C. A. worker of Los Angeles, she soon will become an American citizen.

At the beginning of the war, when the Germans were overrunning Belgium, Mlle. Gombier escaped from a convent with two girl companions and fled to her father's home at Dickebusch Farm for safety. Two days after she reached her home German soldiers took Brussels, she said. A German officer was billeted at her father's house and a German wireless was installed there. Waiting for an opportunity, the girl slipped into the room when the soldiers were absent and succeeded in putting the station out of commission. After a delay of forty-eight hours, however, the machine was repaired and again in operation.

Again, Mlle. Marie, acting according to instructions from the Belgian military authorities, attacked the wireless outfit and destroyed it completely. As she was leaving the cellar where the instruments were located, two German soldiers caught her. She was taken before the German commanding officer and was ordered to be shot. Only through the intercession of the officer who was billeted in the house was she saved from the firing squad.

## Institute of Radio Engineers.

The regular monthly meeting of the Institute was held in the Engineering Societies Building, New York, on September 3. A paper on "Radio Direction Changes and Variations of Audibility" was presented by Major Carl Kinsley, Signal Corps, United States Army.

The October meeting of the Institute will be a joint meeting with the members of the American Institute of Electrical Engineers, at which time the following papers will be presented: "Transoceanic Radio Telegraphy" by E. F. W. Alexanderson; "The Present Status of the Telephone Art" by F. B. Jewett and Bancroft Gherardi, and "Signal Corps Radio Development" by J. H. Dellinger. The meeting will be held on the evening of October 1.

## The Chinese National Wireless Company.

In June the formation of the Chinese National Wireless Company was announced. The board of directors has since been appointed as follows: Vice-Admiral Chen Ngen-tao, chief of the executive board, Ministry of the Navy, Peking; Lieutenant-General Ting Ching, until recently director-general of Military operations, Ministry of War, Peking; Lin Chih-hsin, a Chief du Bureau of the Ministry of Communications, Peking; Godfrey C. Isaacs, managing director of Marconi Wireless Telegraph Co., Ltd., London; T. A. Barson, chairman of the Peking Syndicate, Peking; and A. H. Ginman, representative in China of Marconi's Wireless Telegraph Co.

The company was formed as a result of the agreement made between the Chinese government and Marconi's Wireless Telegraph Company, Ltd., of Marconi House, Strand, London. The company is a joint stock limited liability company created to manufacture and deal in wireless telegraph and telephone apparatus, material and supplies, and to repair and maintain wireless installations now existing and hereafter to be established. The capital is set down as £700,000 divided into 700,000 shares of £1 each. The agreement stipulated that £200,000 of the capital was to be paid up upon signature of the agreement, one-half by the Marconi Company and the other by the Chinese government, the latter having the option, after twenty years, either to buy out the Marconi or sell out their own shares. The Marconi Company grants to the Chinese company the right to use in China, so long as it is a party to the terms and conditions of the agreement, all the Marconi Company's patents, rights, designs, drawings, and secret processes, past, present and future for wireless telegraphy and telephony, in return for one-third of the net profits, though this payment will be discontinued should the Chinese government eventually buy up the entire Chinese company. The Chinese government also has the right, at any time, to abolish the one-third distribution of profits to the Marconi Company by the payment of lump sum to be determined by negotiation, but not to exceed £300,000.

The company is to utilize materials produced in China in preference to imported materials in all cases in which such materials are neither lower in quality nor higher in price than the imported materials. Chinese will be employed on the personnel as far as possible and as soon as the company's works are in operation a school will be established nearby for the technical education of students, the expenses of the school to be borne by the company.

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# UNIFICATION OF THE MANUAL AND AUTOMATIC TELEPHONE SYSTEMS*

BY D. E. WISEMAN

In telephone engineering and the resultant physcial and economic accomplishment, June 1, 1918, figures prominently, for on that date the formal union of the Bell manual telephone system operated by the Pacific Telephone and Telegraph Company, and the Automatic Electric system operated by the Home Telephone and Telegraph Company in the City of Los Angeles, was effected under the management of the newly created Southern California Telephone Company, giving to every telephone user in that area a unified and unrestricted exchange telephone service and universal service over toll trunk lines to some eleven million telephones throughout the United States. Consolidations of this character have been made prior to this date but involving relatively small volumes of traffic and simple operating methods so that there were no records of actual performance or established engineering practices to serve as a precedent and guide for determining the effect of and the physical requirements necessitated by the sudden release of two large, distinct and separately bound volumes of traffic into a common channel.

Because of the novel operating and construction methods and the speculative possibilities involved in the important pioneering work of welding these fundamentally different telephone switching systems into a single eighteen million dollar plant serving 129,000 stations, a semi-technical summary of the events has been prepared for general information.

A brief reference to the conditions which brought about the consolidation will be made in order to better understand the problems that confronted the two competing telephone companies and their subscribers. Believing that competition instead of control was the automatic remedy to apply to public utilities, the City of Los Angeles invited telephone competition about sixteen years ago and then struggled along with her business firms and many of her residents paying two telephone bills for a divided and what proved to be an unsatisfactory telephone service. This condition was continued until the year 1916, when the public decided by popular vote to bring about an end to dual telephone service. Negotiations were begun and various proposals were considered by all concerned in an effort to avoid any waste or arbitrary measures. A plan was finally accepted for the organization of a local telephone company, which was to purchase the properties of the existing operating companies and unify the service, continuing with the equipments then in plant and giving the right to the telephone users to determine for themselves whether they would retain their automatic stations or manual stations. War conditions imposed restrictions in the conservation of materials and men for such projects and called for a careful weighing of the expected benefits and expenditures of materials and labor.

With this clear understanding of the requirements, a joint committee of engineering representatives was appointed to determine the methods for the physical joining of the two systems. As a result of their efforts, a fundamental plan, together with preliminary estimates of cost, was submitted and formally approved by the City of Los Angeles, the Railroad Commission of the State of California and by the Attorney General for the Federal Government, and on May 1, 1917, formal authorization was given to proceed with the project.

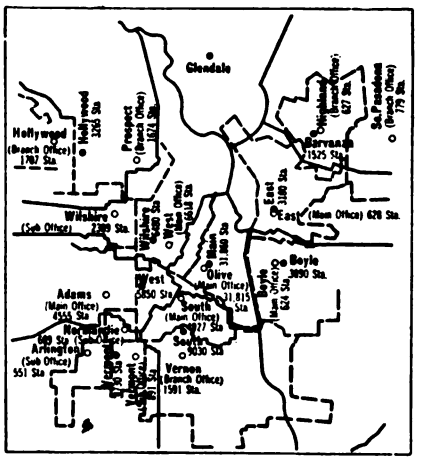


FIG. 1—AREA SERVED BY DUPLICATE PLANTS.

In order to picture the plants as they existed prior to the consolidation, I shall refer briefly to the physical properties and the operating methods of the two systems. Referring for a moment to Fig. 1, the area served by the duplicate plants was about 200 sq. mi. and lying within the corporate city limits. The open and solid circles show office and wire centers of the Home and Pacific Companies, respectively, while the dotted and solid lines mark the areas of the respective districts. The Pacific Company was established first and the opening and location of its offices followed the telephone development of the city. The first office was located in the business area and as the population increased and spread to outlying districts, new offices and districts were established. Each office was located as near as practicable to the center of the wire distributing system as determined by a study of the existing plant and expected growths for 15 or more

*From *Proceedings American Institute of Electrical Engineers, August,* 1919.

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years hence. As years go by and old offices are outgrown studies very often show an economy in subdividing the original district or changing the boundaries so that the natural process tends to correct any errors in estimates of growths and locations of such expected growths.

May 1, 1917, the Pacific Company's exchange consisted of its standard outside plant and station equipment and nine manually-operated central offices serving about 69,000 stations. Bell equipment was used in units having a capacity of 9,600 multiple lines. Telephone connections were established generally by the calling subscriber removing the receiver from the switch hook, causing a light to appear before an answering *A* operator, who upon receiving a request for a particular number cut-in on an order wire to the particular switchboard unit in the district, indicated by the prefix of the number called for. An operator at the distant switchboard unit, assigned a trunk over this order wire to the calling *A* operator and completed the connection by plugging into the called-for subscriber's multiple. Fig. 2 shows a schematic transmission circuit of a typical connection. The operation of this circuit will be described later and in connection with the unified plant.

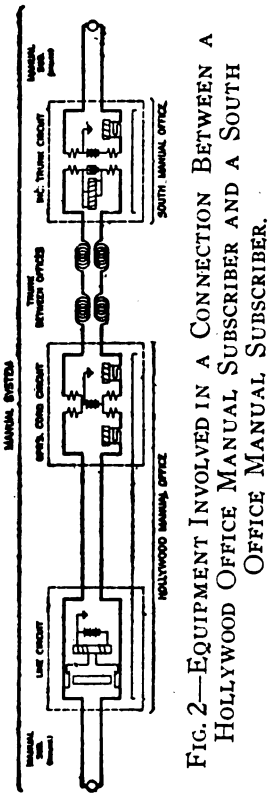

FIG. 2—EQUIPMENT INVOLVED IN A CONNECTION BETWEEN A HOLLYWOOD OFFICE MANUAL SUBSCRIBER AND A SOUTH OFFICE MANUAL SUBSCRIBER.

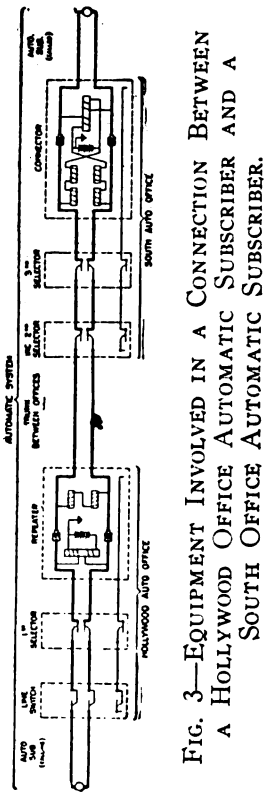

FIG. 3—EQUIPMENT INVOLVED IN A CONNECTION BETWEEN A HOLLYWOOD OFFICE AUTOMATIC SUBSCRIBER AND A SOUTH OFFICE AUTOMATIC SUBSCRIBER.

The former Home Company operated an automatic exchange including a parallel and similary constructed outside plant and fourteen offices serving a total of approximately 60,000 stations. About 35,000 stations were equipped with dials and approximately 25,000 manual stations operated from private branch exchanges and as public pay stations. The lines from the manual stations terminated on a 45-position manual switchboard in the Olive office. Calls from automatic stations to automatic stations were made by dialing five or six digits, as required, to reach the particular district and individual subscriber. In capacity the former Home plant was one of the largest and probably the most successfully operated of any automatic system installed in the United States or abroad. Home Company private branch exchange subscribers were reached by dialing the private branch exchange operator, who completed the connection. Calls outgoing from private branch exchange subscribers were trunked to the manual transfer board above mentioned, the calls coming in on an automatic traffic distributor which placed each line lamp signal before a non-busy operator. The operator upon taking up these connections would complete the call direct if to another private branch exchange station through the subscriber's multiple or dial the number required, if automatic station was wanted. Fig. 3 shows a schematic transmission circuit of a typical full automatic connection. The operations and functions will also be described step by step later.

Los Angeles has had the distinction of having more telephones per capita than any other city in the world and is now very close to the top of the list. This general usage is reflected in the number of calls originating in each system, as shown by the records of traffic. The approximate numbers of daily average calls originating in the former Pacific plant and Home plant were in the vicinity of 430,000 and 420,000, respectively.

The engineering problems demanded, therefore, a reasonably close approximation of the volume of existing and added traffic which could be expected to flow between the groups of stations of the various districts of the two plants; a determination of the most direct and economical routing of such calls based on efficient operating methods and the use of existing facilities; and the design and development of an inter-unit trunking plant and switching circuits necessary to maintain the commercial standards for transmission and supervision between the two systems regardless of the mechanical, electrical and operating inequalities. Visual and audible signals peculiar to the separate systems required for supervisory purposes needed to be synchronized or harmonized and extended when necessary so as to afford common usage.

It is obvious that a great many plans and combinations of plans for unification were developed in sufficient detail to determine their relative capital and operating costs and advantages and disadvantages. The plan in principle that was adopted for handling the inter-office traffic between the systems was to operate all existing offices as units of the complete exchange and route the new automatic or manual trunks of each office into the adjacent office of the opposite system, where the conection could be completed by the most direct method and route.

Having referred to the facts that were most vital in shaping the project, I should like to outline the

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organization and schedule of work involved in the construction program estimated to cost $1,250,000. Every reasonable effort was demanded to bring about a unification of the properties without waste of time, and accordingly a complete schedule for the ordering of materials, manufacturing, assembly and installation thereof was set up after a canvass of probable material deliveries and of the labor situation. It became evident that a period of twelve months would be the shortest time possible to complete the necessary work, keeping in mind that war demands might upset the schedule, and all effort was centered on finishing the project within the minimum time. Specifications and plans were completed for each individual project, numbering all together about 110, and each one was charted with due regard to the materials involved, quantity, desired time of delivery and installation and its relation to the project as a whole.

The largest single project consisted in the design and manufacture of the 66-position special tandem switchboard and associated equipment to be located in Olive office for the translation and distribution of calls from automatic stations to manual stations in the downtown area. This switchboard, together with the switching circuits was designed in detail by the engineers in the general office of the telephone company, and all of the manufacturing and assemply work was performed in San Francisco. Extensive rearrangements of the Olive office building were necessary to provide space for this equipment and for retiring quarters for the large number of operators required to give the necessary 24-hour continuous service.

In the manual offices it was necessary to equip the regular subscriber positions with a dial for sending out the electrical impulses, and to provide outgoing trunks connecting directly with the automatic equipment in the adjacent office. There were approximately 375 subscriber switchboard positions in the manual system in the Los Angeles exchange that required the installation of this special equipment and associated wiring and this proved to be one of the most difficult parts of the work, because such work had to be performed on positions of switchboard that were in continuous operating service. I will refer to Fig. 4 and describe the switching circuit associated with the dials at the operators' positions. Each operator on the subscribers' switchboard is provided with 10 outgoing trunks terminating in the nearest automatic office on first selectors. These outgoing trunks are provided with twin jacks, one above the other, and electrically connected so that the dialing device can be associated with each of the trunk circuits to the distant office. The plug connecting with the dial is inserted in the lower first jack while a call originated by the manual subscriber for an automatic station is connected to the upper first trunk jack by means of a regular *A* operator's double-ended cord circuit. The operator then proceeds to dial the number requested and as soon as this number has been dialed, the operator moves the dial circuit plug to the lower second jack, thereby preselecting the trunk circuit for the next call for an automatic station. The operation of the second and third selectors and final connector is the same as described later under "Automatic to Automatic Connections." The circuit is so arranged that the manual *A* operator just referred to receives direct supervision for both the calling manual and the called for automatic station. At the end of the conversation, the lighting of a lamp associated with each end of the *A* cord circuit indicates to the

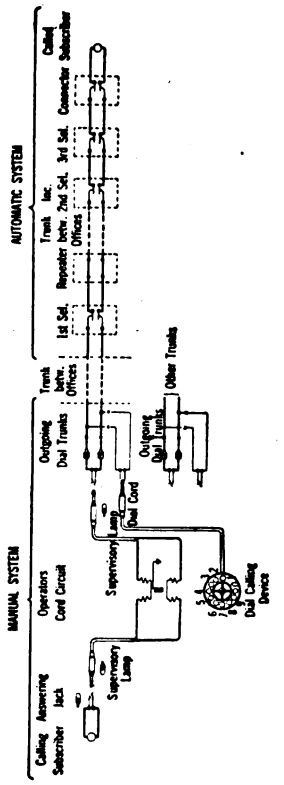


FIG. 4—METHOD OF ESTABLISHING A CONNECTION BY MEANS OF A DIAL CALLING DEVICE.

operator that the connection has been finished and all cords are to be cleared from the subscriber's line and trunk jacks. The outgoing dial trunks are used in rotation and the actual number of the trunks connected by such lines to the distant office varies with the traffic requirements.

Central office telephone installation work has generally been organized for individual projects usually confined to a particular office building. The plan of scheduling the material and utilizing this material to its greatest advantage made it necessary to depart from regular practices of the installing forces and to provide that all of the work should be treated as one project wherein the men trained for specific work were to be moved from one office to another as materials arrived and thereby facilitating the completion of the work regardless of irregularities in the arrival of materials for a particular office.

This arrangement was one of the important factors in effecting the final completion of the central office work, April 30, 1918. The time intervening from the date until the beginning of the delivery of the directory and the formal announce-

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ment of consolidation on June 1, 1918, was required in placing thousands of test calls over all combinations of connections to make sure of positive operation. In a typical connection between an automatic and manual station there are 41 relays, and 79 from manual to automatic, having movable parts controlling from one to ten electrical contacts, each of which must function in the proper sequence from the start to the completion of each telephone call. I do not wish to convey an impression that telephone circuits are inherently subject to failure, for they are not. The characteristics and operating requirments for each relay, for instance, is known mathematically and what it can be depended upon to do for a specific period of time. At regular intervals each type of relay is given its proper current adjustment, using measuring instruments designed for that purpose.

The installation of telephone cables and central office equipment of the manual or automatic type required the use of highly trained and skilled labor and the telephone company faced the difficulty of obtaining the large number of electricians and mechanics required to hold the schedule and training them for special work. As it was, considerable overtime became necessary to maintain a working balance between the arrivals of material and the available labor.

Among the larger items of expenditure, and one involving months of study and calculations in voice transmission were the additions and changes necessary in the cable trunking plant in order to maintain commercial standards on all local and long distance connections. These studies included the use of and application of loading coils to the former Home Company cable plant amounting to about 1000 coils and the addition and respacing of many of the coils in the portion of the Pacific Company cable plant. All together about 75,000,000 conductor-feet of various gages of underground telephone cables were ordered and installed to provide new routes and reinforce existing trunk groups required for consolidated service.

Prior to the consolidation, practically all of the subscribers having private branch exchanges maintained duplicate switchboards and station apparatus. The problem, therefore, of consolidating this type of equipment offered no particular difficulty, as such consolidations could be and were effected by grouping the trunks formerly serving the separate systems on the particular switchboard to be retained, adding thereto the amount of line and trunk facilities desired by the subscriber and eliminating the duplicate switchboard and stations not required. The net effect was to remove about 345 single-position private exchange switchboards from the system. In the case of several of the larger commercial companies, it was necessary to order complete multiple private branch exchange switchboards of the 640-line capacity and about 30 sections of such boards were placed in service as fast as the equipment could be engineered and manufactured. It will be interesting to note that the flow of traffic to and from private exchanges was not greatly disturbed from the existing paths by this plan of consolidating, a principle which was kept well in mind and taken advantage of wherever practicable.

Where individual and party stations were duplicated, both stations were left connected until the new directories were delivered, at which time the subscriber was requested to use the telephone of the particular system that he had made application for and the other station was removed as soon as the construction forces could handle the work. Approximately 13,000 duplicate stations have been removed.

A considerable number of operators were required and for a while it looked very much as if the consodidation would have to be postponed because of the inability to obtain the needed force. Good service depends to a large extent on capable and efficient operators and you can appreciate the difficulty that confronted the operating department in the selection, employ and training of approximately 500 additional operators required for handling the special transfer switchboard installed in the Olive office building, and for the large number of added positions of switchboard in the various manual offices. A large operating school equipment was hurriedly manufactured and installed and training of operators was started about the first of the year 1918. The schedules also provided for the early installation of dials on the subscriber positions in the manual offices for advance training of the regular operating force. Special observation equipment was designed and furnished for practice work in placing test calls and later for supervision in determining and checking the accuracy of dialing the calls placed by the subscribers. By means of automatic recording devices the numbers called for by the subscribers or instructors were compared with the numbers actually dialed and in this way the operating force was gradually brought to an efficient basis by the time the construction work was completed.

Proceeding under the restrictions that each subscriber having duplicate service should determine for himself whether to retain automatic or manual substation equipment, the commercial department carried on a vigorous campaign to obtain these subscribers' choices and to arrange accordingly. I do not have the exact figures but I understand that of the 18,680 duplicate stations about 5,200 duplicates were retained and the balance were divided evenly between the two types. The expected result of this canvass has been forecasted and was an essential factor in engineering and in construction work.

As a function of the commercial canvass the Directory Department was confronted with the necessity of recasting the entire directory scheme to the particular needs of a unified service. A great amount of thought was given to the determination of the most efficient arrangement of listing and numbering subscribers, and while this seems trivial yet a careless directory arrangement reflects on the quality of the telephone service and robs the public

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of valuable time. Many number of changes were involved and a complete relisting of every subscriber's name and number into one alphabetical list introduced great possibilities of errors. (It is a matter of passing interest that 165,000 copies of the directory were issued and distributed in Los Angeles and to other exchanges for long- and short-haul toll traffic and that over 441,000 pounds of paper were required in the printing of the consolidation issue.)

In the present unified plant, local calls are divided into four main groups and are obtained in the following ways:

*Calls from Automatic Stations to Automatic Stations* are obtained in the same manner as under the former Home management, that is, by the subscriber dialing the number wanted as indicated by the directory listing. Such subscriber sets are proprovided with the familiar dialing device arranged to transmit from one to ten electrical impulses for each "pull" of the dial. In the automatic system most of the stations are reached by dialing five digits although there are a few thousand six digit numbers. The operation of the first digit of the five digit numbers selects the office district required, the second digit selects the particular thousand, the third digit selects the particular hundred, while the fourth and fifth digits select the tens and units respectively of the number desired. Referring to Fig. 3, the calling automatic subscriber upon removing the receiver from the switchhook completes an electrical circuit through a Keith line switch, the chief function of which is to direct the simultaneous calls to a minimum number of trunks to first selectors. Each automatic line therefore terminates on a primary line switch having ten paths to as many first selectors, these trunks being multiplied to other line switches, depending on the calling rate or traffic load of the particular group of lines. The operation of the first digit of the number wanted causes the mechanism of the first selector to step the brush terminals upward to one of the ten levels, arbitrarily connecting to a particular 10,000-line unit. This selector is of the trunk-hunting type, that is, the subscriber, as noted above, having dialed, say, the digit 6, causes six electrical impulses to be transmitted through the selector mechanism through the stepping relay, raising the brushes to the sixth level. The selector then automatically begins a rotary movement and continues until an idle trunk is found. There are ten trunks over which this rotary trunk selection takes place and the traffic is so distributed over selector equipment that with very few exceptions an idle trunk will be found within this group of ten. The connection is then established through what is termed repeater equipment (consisting of coils and relays by the aid of which the calling impulses are repeated from the local to the distant office and talking battery is provided to the calling station) to a particular second selector in the distant office. The dialing of the second digit by the calling subscriber again operates the stepping mechanism to one of the ten levels corresponding to the thousands of the number wanted. Automatic rotary movement takes place, selecting an idle trunk to the third selector where the dialing and selecting of the hundreds is the same as for the first and second selectors. The connection now is established through to the connectors which is similar in its operation to selectors with the exception that the ten digit steps the mechanism to the corresponding level while the units' digit controls the rotary movement to the particular unit required. The connector also supplies talking battery to the called subscriber and sends out the necessary ringing impulses to call either the individual or party subscriber desired or sends back the busy signal if the line called is in use. The restoring of the receivers to their switchhooks automatically returns all of the connecting equipment to normal position again for use on subsequent connections.

*Calls from Automatic Stations to Manual Stations* are obtained by operation of an arbitrarily assigned digit, the ninth digit or level being available in this case. Trunks from these first selector ninth levels lead the nearest manual office and terminate by the aid of the familiar line and cutoff relay on an answering jack with a lamp signal before an *A* operator. Referring to Figs. 5 and 6, the *A* operator upon receiving a line lamp signal, plugs into the corresponding answering jack and requests the subscriber to give the number (and office prefix) wanted as shown by the directory listings. The call is then completed within the office received or is trunked over the manual trunking system to the distant *B* operator in the same manner as described under calls, manual to manual. In the downtown district where a considerable amount of traffic is involved, it was found impossible to add to the large number of *A* positions to the various manual units and it was necessary to install a special manual switchboard, in available space in the Olive office building. This special board contains only the necessary multipled terminating lines, outgoing trunks

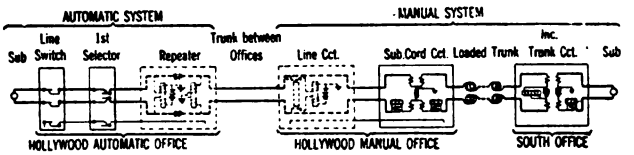


FIG. 5—EQUIPMENT INVOLVED IN A CONNECTION BETWEEN A HOLLYWOOD OFFICE AUTOMATIC SUBSCRIBER AND A SOUTH OFFICE MANUAL SUBSRIBER

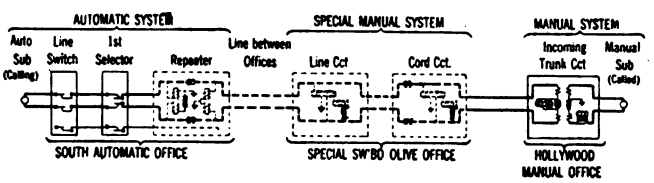


FIG. 6—EQUIPMENT INVOLVED IN A CONNECTION BETWEEN A SOUTH OFFICE AUTOMATIC SUBSCRIBER AND A SOUTH OFFICE MANUAL SUBSCRIBER

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and key and supervisory equipment necessary for establishing the connections between the automatic and manual system. Automatic calls therefore in this district are completed by the dialing of the digit 9 as before, bringing the line signal in on this special *A* switchboard where such connections are completed as in regular manual practice over trunk lines assigned over order wires.

*Calls from Manual Stations to Manual Stations* are obtained in the same manner as existed prior to the consolidation, that is, by the agency of the *A* and *B* operators and corresponding manual switchboards. Referring to Fig. 2, the calling manual subscriber upon lifting the receiver from the hook causes a lamp to light before an *A* operator in his district. This line terminates on the ordinary line and cutoff relays, the former operating as soon as the switchhook closes the circuit, causing the line lamp to burn. The *A* operator then plugs into the corresponding line jack with one end of a double-ended cord circuit, this operation causing the cutoff relay to energize and thereby opening the circuit through the line relay and lamp. The operator then throws the listening key and requests the called for number. She then proceeds to complete the connection by plugging either directly into the subscriber multiple or by plugging into a trunk line leading to the distant office required and as assigned by the distant *B* operator over an order wire circuit. The distant trunk operator then plugs into the required subscriber's multiple and automatic ringing proceeds until the subscriber answers. Supervisory lamps associated with both the trunk cord and the double-ended *A* cord furnish the necessary indication to the operators of the establishment of the connection and end of the conversation. When both lamps associated with the double-ended *A* operator's cord relight, the connection is taken down and this operation gives a disconnect signal also to the distant trunk operator.

*Calls from Manual Stations to Automatic Stations* are obtained by direct trunk circuits. An *A* operator receiving a manual subscriber's request for a particular automatic number, as indicated by the directory listing, proceeds to dial the number in the same manner as described above for an automatic subscriber. Each *A* operator is provided with a group of trunks, as shown by Fig. 4 and described in the first part of this paper, leading to the nearest automatic office and terminating directly on first selectors.

*Private Branch Exchange Calls* originating from such exchanges of the former Home Company were formerly operated and are still operated on a manual basis. Calls placed by extension stations from these private exchanges are trunked to a manual switchboard in the Olive office building, this switchboard having the familiar subscriber multiple of all the private exchange trunk lines. The incoming private exchange trunk lines, however, are carried through Keith line switches, the function of which is to select a non-busy operator and to place the line lamp signal before the operator. This arrangement is commonly known as the traffic distributor. This pre-selected operator then receives the request for either an automatic or manual number and if for the former, she dials the number as described above for manual *A* operators. If the called for number is for another private exchange station,, the operator completes the connection in the multiple similar to a manual-to-manual connection and if the request is for a station in a manual office, it may be obtained by the use of order wires and trunks direct to the office required or over trunk lines to the special Olive office manual *A* board. All connections to and from the former Pacific manual private branch exchange stations are completed in accordance with the above general methods of handling calls to and from manual stations.

So far as I know, no definite statement can be made as to the gains accruing to the subscriber at Los Angeles under the consolidated arrangement, because the most important factors are not capable of reduction to equated savings in dollars.

Some of the major factors resulting in direct benefit are:

1. Value to the subscribers resulting from telephone access to each and every subscriber in the Los Angeles exchange and to all long distance lines centering there.
2. Rental savings resulting from the elimination of a large number of duplicate stations and private exchange switchboards.
3. Elimination of the indirect economic loss due to confusion and community service inefficiency of separate telephone systems.

Some of the factors which tend to offset part of the savings are:

1. Added annual charges on the plant and equipment required to provide means for universal service. There was very little elimination of duplicate plant investment primarily because each plant was designed to care for a definite development and volume of traffic. Consolidation obviously does not reduce traffic volume, but because the telephone field is considerably increased to every subscriber, the total volume of traffic in the consolidated plant is substantially increased.
2. Added operating and maintenance costs.

From a careful weighing of these factors it is manifest that the consolidated plant offers substantial savings and benefits over the dual systems. The worth of a telephone system to any community lies, not only in its capacity for effecting good service but that such service shall be universal and available to the maximum possible number of local and distant subscribers.

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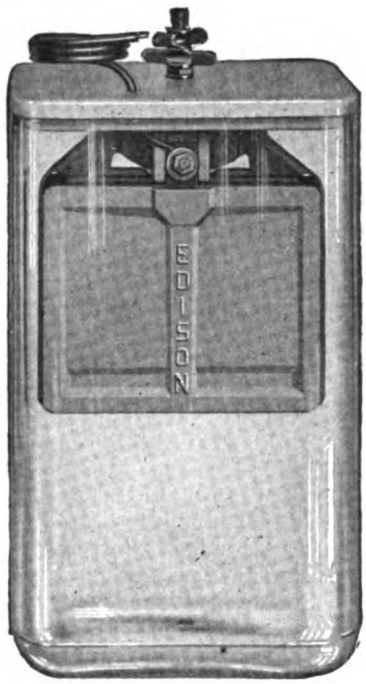

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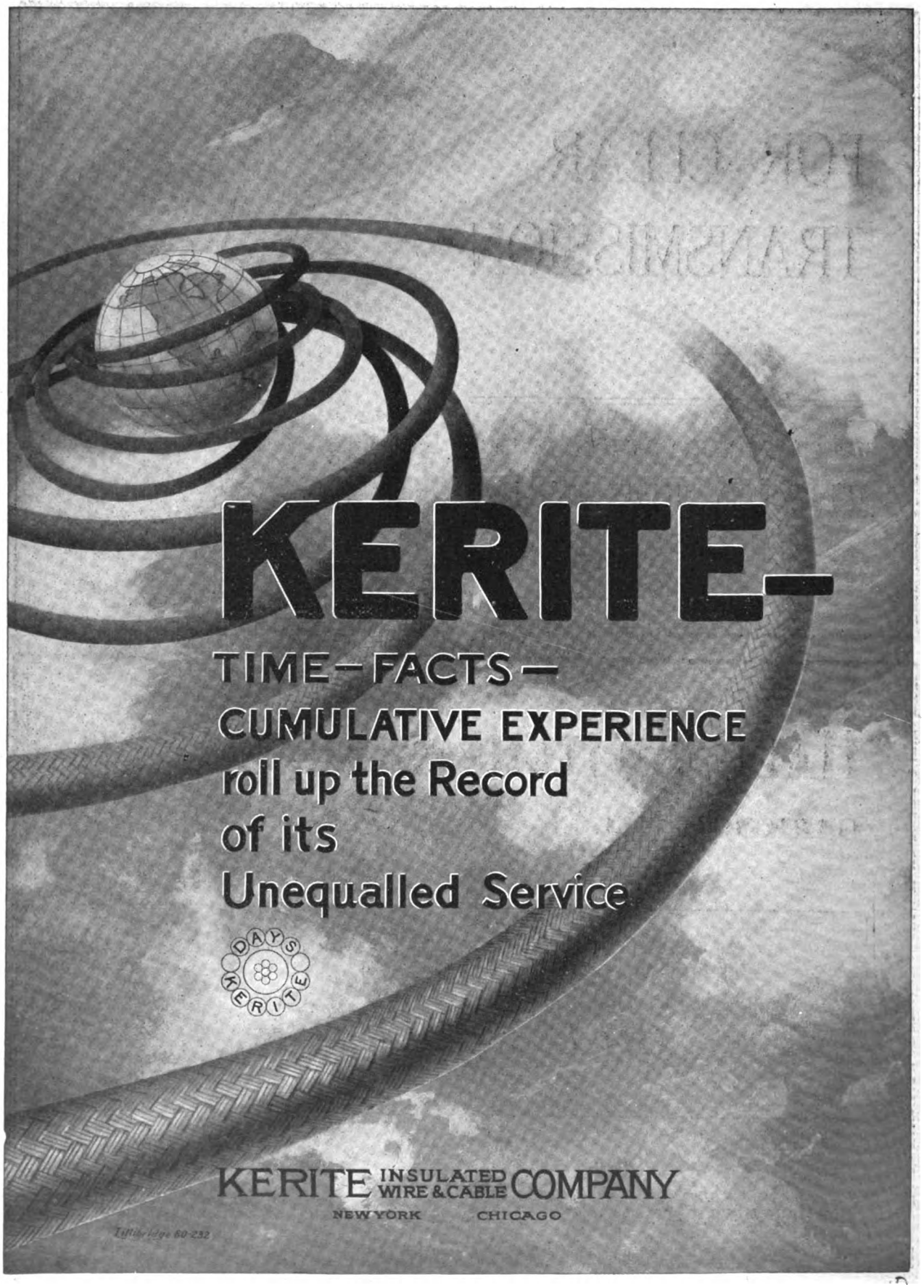


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## THE RAILROAD.

H. HULATT, manager of telegraphs, Grand Trunk Railway System, and Grand Trunk Pacific Railway, Montreal, is making a trip of inspection over the lines between Winnipeg, Man., and Prince Rupert, B. C., visiting important points en route.

A. B. SMITH, who retired as manager of telegraphs of the Grand Trunk and Grand Trunk Pacific Railways in October, 1915, has been spending the summer months at Old Orchard, Me.

A. P. LINNELL, traffic supervisor of telegraphs, Grand Trunk Railway System, Montreal, is on a trip of inspection over eastern lines of the company.

E. H. BOUTWELL, is manager of the District Director's telegraph office, "HW," at Cincinnati, Ohio, and F. L. Schaf, manager of the C. C. C. & St. L., office at Springfield, Ohio, described in the article which appeared on page 430, September 1 issue of TELEGRAPH AND TELEPHONE AGE. These two railroad telegraph offices are excellent examples of up to date telegraph equipment, and likely are models for installations to be planned for the future.

E. A. CHENERY, general superintendent of telegraph, Southwestern Region, United States Railroad Administration, St. Louis, Mo., reports that authority has been granted for a new telephone dispatching circuit on the Missouri Pacific Railroad between Little Rock, Ark., and Monroe, La., a distance of 200 miles, with dispatchers located at McGehee, Ark., in the center of the line. This circuit will be equipped with Western Electric alternating current selectors. The line wires are now in place and installation of the instruments will be started as soon as all transpositions have been made and apparatus received.

COMMITTEE No. 4, Protection Against Lightning and Electric Light and Power circuits, Telegraph and Telephone Division, American Railroad Association, held a meeting in New York September 4. The members of the committee are: J. F. Caskey, chairman, and Messrs. L. Behner, W. L. Cook, H. W. Drake, I. C. Forshee, W. M. Gould, Stanley Rhoads, and H. A. Shepard.

### Northern Pacific Railroad.

TELEGRAPH AND TELEPHONE NOTES.

Effective September 1, Henry C. James was appointed general telegraph foreman, with headquarters at St. Paul, Minn., vice T. E. Anderson who resumes his former position as telegraph supervisor at Livingston, Mont.

J. B. Johnston, acting telegraph supervisor at Livingston, Mont., resumes his former position as equipment inspector. These changes have been made owing to the return of Mr. James from military service. He was formerly valuation engineer in this company's service.

N. De Bree has been appointed late night chief operator at Dickinson, N. D., repeater station, vice H. G. Johnson transferred to St. Paul. Early in August Mr. De Bree met with an accident while automobiling, suffering a broken collar bone. He is now rapidly recovering.

E. C. Adams, operator in the Tacoma, Wash., relay office has resigned to accept a position as wire chief in the service of the American Telephone and Telegraph Company at Portland, Ore.

The following division linemen have returned from military duty and resumed their former positions: C. L. Rossley, Duluth, Minn.; Carl Simpson, St. Paul, Minn.; R. H. Ohmeiss, Dawson, N. D.; and J. H. Haines, Kanaskat, Wash. Gang foreman E. C. Wiggin, also has returned from military service and is now in charge of a line construction crew.

### Chicago and North Western Railroad.

JOHN YOUNG, lineman, stationed at Mt. Vernon, Iowa, is at home, quarantined for a period of 21 days, because of sickness in his family.

JOHN W. HARRINGTON, foreman, telegraph department, stationed at Baraboo, Wis., is in Washington, D. C., visiting his daughter, whose husband, a chemical engineer, is in military service.

### Electricity and Magnetism.

A First Book of Electricity and Magnetism, by W. P. Maycock, is a work which constitutes a thorough course in elementary electrical engineering. The book is pocket size and contains 350 pages, covering in an instructive manner all of the principles concerned in the design and operation of electrical instruments. One especially valuable feature of the book is a section on electrical experiments which enables the student to develop and prove the theories discussed throughout the text of the work.

The price of the book is $1.25, and copies may be purchased from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

THOUSANDS OF OUR READERS are seeking an electrical education. They realize that in the contest for supremacy in the business world they cannot know too much. Knowledge is a stock in trade. Experts in electricity have positions with big pay awaiting them. Theo. Audel and Company, 72 Fifth Avenue, New York, advertise on another page Hawkins' Electrical Guides, which explain just what you need to know about electricity. There are ten books to the set, consisting of 3,500 pages, with 4,700 illustrations. Read their advertisement for the contents of each of these ten volumes and you will conclude that this valuable educational matter is obtainable at a nominal price.

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## THE TELEGRAPH PROFESSION.

By H. Hulatt, Manager of Telegraphs, Grand Trunk Railway System and Grand Trunk Pacific Railway, Montreal, Que.

I trust my preceding article has convinced some, if not all, ambitious readers of Telegraph and Telephone Age, and particularly those employed in railroad service, of not only the desirability, but the absolute necessity of taking steps to improve, what to many of us is our only capital, their mental equipment.

The whole commercial and industrial field, and in this description is included the telegraph profession, is and always has been more or less a field of battle, i. e., competition, and incidentally the fight is getting more strenuous every year. Never in history was the phrase, "the survival of the fittest", more true than it is today. We compete against others for promotion in our own organizations; we compete against other organizations in the same lines as ourselves for business. To eliminate competition, would result in the disappearance of half the joy of living—it is fighting in a straight, square way which brings joy to the red-blooded man, and incidentally assists him to develop and know himself.

If we are going to fight a crowd our first thought is to secure some suitable weapon. The great war just ended was won not only by the pluck of the men engaged, but, by the wonderful organization and system evolved.

The majority of us have only one thing in life of primary importance personally to sell; that is our services, and in order to obtain a good price for our services, we have to prove that we have the necessary weapons to use in the battle of competition; in the main, good, sound judgment founded on experience and education, and loyalty which, of necessity, includes honesty. Also we must exercise what is commonly called push, or "pep."

Before proceeding further to make suggestions as to how we can improve ourselves educationally, and still carry on earning our bread and butter, I would like to emphasize that I have absolutely no use for a "blue stocking" or "mollycoddle", and am very strongly of the opinion that "all work and no play makes Jack a dull boy"; it is quite possible for a young man to spend an hour or so a day studying, and yet enjoy the outdoor and social recreations essential to the retention of good health and spirits. Without good health you cannot have "pep".

This matter of education is to my mind not only personal to the individual, but a responsibility on the part of all, particularly those having charge of men.

Officers of railroad telegraph departments should set their men an example by themselves studying, and encouraging their subordinates to do the same. I feel that we who are privileged to be executives and have more or less the destinies of large numbers of men in our hands, have a very great and heavy responsibility in this connection. The more we study, the more we realize how much there is which we ought to know,—which we do not know.

An executive should make sure that his immediate assistants are studying, and they in turn should encourage the men further down the line to do the same. Promotion should be dependent not only upon whether or not a man has seniority or has adequately filled the position he has occupied, but also be based on whether or not the man has by broad study qualified for even a higher position than the one vacant.

Executives and subordinate officers must realize that they are not the only ones in their organization blessed with "grey matter". Many a pearl has come from an oyster shell of quite ordinary appearance, and it is the pearls that are needed and that count in business life. Having this in mind I would urge in organizations where it has not yet been practiced, that a systematic program of conventions or meetings of officers and employees, by means of which personal contact can be established, matters relating to business efficiency thrashed out, and the benefits of education discussed, should be organized.

This plan has been carried out in my own organization, to the benefit of subordinate officials and employees; most decidedly to my own benefit, and has resulted in increased efficiency all 'round.

A valuable educational agency available to ourselves and our men is undoubtedly the Telegraph and Telephone Division of the American Railroad Association, particularly in connection with the reports of the various committees. To my mind such reports should be distributed to officers and employees of the telegraph departments for their consideration and study, and discussion at departmental meetings. The representative members of roads attending conventions of the Division would then be much better equipped, on the basis that two intellects are better than one, to discuss matters coming before the convention, thereby benefitting all attending such conventions.

Subordinate officials and employees who have plainly indicated an interest in developing themselves, should not only be encouraged by promotion, but also by being sent to conventions of the Division, and if qualified nominated to serve on committees.

To the young man entering telegraph service I would say: look ahead, enjoy life, but at the same time equip yourself for the days to come, develop initiative, assume without question responsibility, take up elementary electricity, mathematics, etc., ask all the questions you can, have some ambition other than thumping a key all your life, as you rise in your profession, and incidentally increase your education, dive into books of philosophy, science, history, economics, and kindred subjects, all of which will tend to make you a bigger, broader man, in fact, an efficient executive, which should be your great ambition.—*Nil Desperandum.*

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Thomas Rickman of Excelsior Springs, Mo., in renewing his subscription for another year, states that he would sooner be deprived of his daily paper than Telegraph and Telephone Age.

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# RADIO TELEGRAPHY IN COMPETITION WITH WIRE TELEGRAPHY IN OVERLAND WORK

BY ROBERT BOYD BLACK., FEDERAL TELEGRAPH COMPANY, SAN FRANCISCO, CAL.

*(Continued from page 434, September 1 issue.)*

### WAY STATIONS.

Way stations for the most part should be established in the smaller towns in the vicinity of the relay stations. Normally they would transmit their business to the nearest relay station, excepting that which was destined to stations in their own group.

In practice it has been found that although it is possible for the way station to send its messages directly to its destination, time may be saved by relaying it; for by so routing it work over trunk circuits goes on uninterruptedly.

The duplexing of such stations would hardly pay at present, involving, as it does, the erection of one station for sending and one for receiving, with consequent additional cost for maintenance and operation. These circuits would, in effect, be in multiple at the relay station; and the way station (where one man would act as operator and manager) would be able to "break" at any time to answer the telephone, wait on the counter or attend to other duties. With late types of reliable receiving instruments there should be very little necessity for breaking at the relay station. At these the operator would have no outside duties to perform.

In a way station, the complete sending and receiving equipment should be located in a ground floor office, near the center of the business district, in at least as good a location as that of the competing telegraph companies. In all cases the necessary motor generator set should be started and stopped from the operating table by a remote control. A wave changer should be installed within easy reaching distance, as should the rest of the set. A fast repeating (relay) key should be provided, operated by a small Morse key. A sparking wavemeter should be provided to show that the station was radiating properly.

In the receiving set several pairs of condensers and inductances should be provided, each pair tuned to a certain wave length, and any set instantly available by throwing a single switch. If it were desired to receive on any other than the regular wave length, it would only be necessary to throw one switch, which should be wired up to include the necessary inductance and capacity for the desired wave length. This would save the valuable time lost in tuning for the different wave.

The change from sending to receiving positions should all be done in one switch. The other arrangements should be practically the same as for a relay station.

### OPERATION.

In the operation of this system, the way station, before proceeding to call the relay station, would listen in on the regular wave length which had been allotted to its group. If that circuit were busy, the operator would listen on each of the other wave lengths until he found one which was not being used. He would then proceed to call the relay station, which would be provided with a receiving set attuned to that wave length. Upon receiving a reply he would proceed to send his business upon the idle wave length or upon any other which the relay station might designate. With two or three wave lengths allotted to each way station, and these tuned in and covered at the relay station, there should be very little delay on account of the circuits being in use by other stations. These circuits might be designated as "A", "B" "C", etc., to facilitate quick change from one to another.

The relay station normally would call a way station on one particular wave length and then arrange for transmission on another if the regular wave length were busy.

For intercommunication between two way stations, the call would be made on the regular wave length, and transmission effected on one of the auxiliary wave lengths in order to keep the regular wave length clear for calling purposes.

In the handling of this class of business the methods of the American telegraph companies should be followed as closely as possible consistent with proper observance of the rules governing radio communication. The results arrived at by wire companies in the way of improving the working capacity of a circuit are based upon years of experience and probably represent the highest efficiency obtainable in this regard. It has been proven in actual work that the elimination of unnecessary prefixes and other superfluous characters has been a big factor in increasing the capacity of telegraph circuits.

Automatic high speed work in radio telegraphy at the present time is dependent upon unusually good atmospheric conditions. While some very good results have been obtained in this line at times, the system on the whole is costly and occasions delays which show up badly in comparison with the fast service of the wire companies. A burst of strays lasting only a fraction of a second is sufficient to obliterate a whole word or more of the high speed signals; whereas an experienced operator, copying at the regular rate of speed, would probably be able to fill in the one or two missing letters which a discharge of the same duration of time would cover. Even among the wire companies, the manual system is still recognized as the more reliable for all around work.

The capacity of the circuit, then, depends to a great extent on the skill of the operators employed. There is room for considerable improvement in this

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portion of radio work in order to equal the work done by the fast wire operators.

OPERATORS.

While ability for fast sending in an operator is desirable, it must be combined with other qualities. Good judgment, coolheadedness and ability to read poor copy are just as necessary qualifications in sending as high speed. Generally speaking, a medium speed, methodical sender watching his copy closely, eliminating all unnecessary characters, calling attention to misspelled words, avoiding "combinations", and taking especial care in the transmission of code or unusual words, will make better time than the fast, erratic sender. Automatic transmitters, sending purely mechanical signals have not proven entirely satisfactory for manual reception on account of the sameness of speed which does not allow for the unusual words. However, the proportion of rapid hand senders among telegraphers is very small, and a hand sender may find his efficiency impaired at any time by operator's paralysis. An instrument called a "sending machine" is being widely used by telegraphers, both wire and radio, at the present time. This is an ingenious instrument which works with a side motion, the lever on one side making contact for the dashes, and on the other side starting a mechanical vibrator which makes dots as long as the key is held over. The characters are formed by combining the action of the two. It can readily be seen that there is a great saving in labor when using such a device, and its use practically eliminates paralysis. It is operated with one hand, leaving the other free for marking off and sorting messages. Properly adjusted, a sending machine permits of faster sending and better spacing in the hands of the average operator, and it will carry through on any circuit where fast hand sending will carry.

"Combination" sending is a very common fault among telegraphers and one that should be assiduously guarded against. This is improper timing of the dots, dashes, and spacing. This spoils the whole time rhythm, and the receiving operator has the same difficulty in reading the signals as is usually experienced in listening to a stuttering person over a telephone line. Usually the sender is unaware of this fault and imagines he is sending perfect signals. Probably the best method of showing an operator his failings in this respect is to take phonographic records of his sending and compare them with signals which are correctly timed.

Among the commercial operators of the United States, a knowledge of the Phillips Code of abbreviations is coming to be generally recognized as part of an operator's education. This is a system of abbreviations embracing a large proportion of the most frequently used words of the English language, with a complete system of punctuation. It is based on a very comprehensive plan and follows set rules for terminations. The abbreviations are nearly all suggestive of the word which they represent, and are, therefore, not difficult to memorize.

In practice, the sender simply sends the correct abbreviation for a word, and the receiver spells it out in full and writes it down. Using a typewriter. This is comparatively easy, as the speed of the average typewriter operator is about double that of the fastest sender. This code is used by all American press and brokers' telegraphers, and enables them almost to double their speed. It is also used considerably on the fast commercial wires, and at all times when press is being handled. Knowledge of it is always a help to an operator, if only for the accuracy it gives in conversation in connection with the handling of business. It is obvious that if abbreviations are to be used, a regular system should be followed.

The International List of Radio Abbreviations, while forming a handy medium for carrying on a conversation between operators using different languages, is not sufficiently expressive to cover all conditions encountered in telegraph work. Moreover, it is an arbitrary code, not easy to memorize. In the Phillips Code, there are no two abbreviations alike, and if both operators have a good understanding of the code there is very little liability of error.

A radio duplex, like a wire duplex, is as good as two separate circuits, as long as the number of "breaks" is reduced to a minimum. Therefore, both sender and receiver should endeavor to avoid breaks as much as possible. This can only be done by complete co-operation and first class work on the part of each operator. One inefficient man on a duplex can practically nullify the work of the other three.

To the training in this work, and to the general training in concentration, discrimination, and mechanical skill, which only years of experience can give, is due mainly the success in fast radio work of the ex-wire operators who have mastered the Continental Code and the necessary technical knowledge. It is admitted among wire telegraphers that it takes on an average of two years or more of all-around experience on the fastest circuits to produce a really first class operator. Even then there are failures, as in every line of endeavor. The equivalent experience on fast radio circuits should give just as good results.

It is obvious that a radio operator must have a good technical knowledge of his apparatus to get the best results. While this knowledge must be subordinated slightly to telegraphic ability in a large office where other expert technical men are available, the knowledge would at all times prove a big asset.

With such an equipment and organization it would seem that a radio company would be in a position to compete successfully with the wire companies in every line of the work. The cost of operation for results achieved should run as low as or lower than that of the wire companies, with their heavy upkeep and right of way costs. The facilities of the radio would, in some ways, be superior to the wire telegraph; and the occasional severe atmospheric difficulties of the radio would be counter-balanced by the occasional total prostration of the

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wire telegraph during floods, sleet storms, and the like. In addition, districts could be served where wire service is impracticable because of the physical difficulties which prevent proper maintenance of telegraph lines.

A chain of stations of this type, backed by an efficient organization of employees, would be a valuable asset to the nation and to the districts it served in the event of wire prostration, or national disaster. On this account, it would seem that it would be sound policy for the Government to encourage and facilitate in every way the extension and operation of such a system.

Probably the nearest approach to the ideal conditions outlined herein is furnished by the chain of stations operated by the Federal Telegraph Company on the Pacific coast. This includes the Los Angeles-San Francisco duplex, and the San Francisco-Portland duplex, and one way "break" systems between Los Angeles and San Diego; Los Angeles and Phœnix, Arizona; and San Francisco and Honolulu.

The Los Angeles-San Francisco duplex, having been in operation for a period of nearly two years, is probably the best known, and will be described here.

### LOS ANGELES OFFICE.

The equipment at the downtown receiving office at Los Angeles consists of two of the latest type sustained wave receiving sets, one normally tuned to receive San Francisco on a wave length of 3500 meters, and the other normally tuned to receive San Diego and Phœnix on 2750 meters. The San Diego-Phœnix set can instantly be put in service for receiving damped waves on 600 meters by throwing a single switch.

The antenna for receiving San Francisco is composed of three wires, each 320 feet (100 m.) long, suspended between two office buildings at an average height of 175 feet (53 m.). The San Diego-Phœnix antenna is composed of a single wire, running almost parallel to the San Francisco antenna, and of slightly greater length. No towers are used to suspend these antennas. They are simply swung between the two buildings at the level of the roof. Either of these antennas can be used separately for receiving multiplex, making the use of four or more receiving sets practicable.

The operating room is on an open balcony, running across the rear of the main receiving office, which occupies a store front in the center of the city. It is subject to the ordinary noises of the street, but this causes no interference with the received signals, which are ordinarily strong and clear enough to be read under all conditions.

The operating table runs across the front of the balcony and is 12 feet (3.1m) long, wings on each end supporting the receiving sets. Pockets are provided at each end of the table for typewriters. Two visible writing typewriters are used for receiving and are so located that all tuning can be done while sitting in front of them. The sending operators sit directly beside the receiving operators. Keys operating the control circuits which run to the two transmitting stations are available from all sending and receiving positions. Telegraph sounders and resonators are provided for the sending operators. A single telephone receiver, on an extension arm, and in series with the receiving telephones of the San Francisco board, is provided for the sending operator on that circuit so that he may listen to San Francisco's "breaks."

All induction from telegraph control circuits has been eliminated by the placing of condensers of one micofarad capacity across the line, and the induction from the automatic telephone call system on the main floor has been nullified by the placing of resistance coils in the telephone ground lead.

All messages as they are received by the distant stations, are copied directly, in duplicate, on the typewriter, and dropped into a chute (conveniently located beside the receiving operator) which deposits them on the delivery desk on the main floor. Outgoing messages are delivered on the operating table on the balcony by a device similar to the trolley systems used in department stores. In the handling of relay messages it is simply a matter of one operator handing them to another.

Two transmitting stations are controlled from this office and are practically duplicates of each other in so far as power and equipment are concerned, and are three and five (5 and 8km.) from the downtown receiving office. Each transmitting station is equipped with a 12 kilowatt Poulsen arc coverter, although normally less than half of this amount of power is used. Both are arranged for transmitting upon several wave lengths, the corresponding waves at the two stations being of exactly the same length, so that in case of the failure of one the other may be immediately put on the wave length being used, and transmission resumed without delay. This permits of one station being operated singly on holidays, etc., when there is not sufficient business to warrant keeping two stations in operation.

Normally one station is used for transmitting to San Francisco on a wave length of 3250 meters, while the other, on a wave length of 3750 meters, is used for transmitting to San Diego, Phœnix and the steamships equipped with Federal apparatus on the Pacific (which constitute a fair sized fleet). Other wave lengths are available for a second sending circuit to San Francisco when business warrants. All the company's sending stations are equipped for sending and receiving on the sustained waves of the Poulsen system. In sending on 600 meters, a chopper is used in series with the antenna. This furnishes a very pure musical note, at a frequency of about 500 cycles. The damped wave receivers can be instantly cut in for short wave work. Each station is in charge of a first grade commercial radio operator. These operators are available for duty at the receiving offices when required, and the operators at the receiving offices are available for duty as arc operators at the transmitting stations.

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Considerable flexibility in working staff is obtained through this arrangement.

San Diego and Phœnix normally transmit to Los Angeles on the same wave length, so that no tuning is required to hear either of these stations at any time. In addition, these stations have an auxiliary wave length exactly corresponding to that used by San Francisco, so that they can use that as a regular wave length when only one man is on duty at the Los Angeles office. During the busy part of the day three, and sometimes four, men are on duty at the Los Angeles office.

### SAN FRANCISCO OFFICE.

The receiving office at San Francisco is located on the eighth floor of a twenty-story building, and is provided with two receiving antennas of the same type as those at Los Angeles. One of these antennas is used for receiving Honolulu and the ships and the other is used for receiving Los Angeles and Portland simultaneously, providing quadruplex receiving. Two transmitting stations are controlled from this office, one of these being a duplicate of the two Los Angeles stations, and the other at South San Francisco has two transmitters and two antennas providing triplex sending.

Honolulu as well as Los Angeles and Portland is copied directly on a typewriter at the San Francisco receiving office and the copies as they are received are dispatched to the delivery department on the first floor through a pneumatic tube.

At the San Francisco receiving office five or six men are on duty at all times during the day, working side by side, and handling heavy traffic, without interference. Moreover, the San Francisco office is in the center of the interference zone of the Pacific coast, there being five high power stations in the immediate vicinity.

The work with Honolulu has been carried on for about five years and has been very satisfactory. A regular commercial service has been maintained and most of the news service carried by the Honolulu papers has been handled by the Federal Telegraph Company. The Honolulu end of this circuit will be duplexed in the near future to take care of increasing business.

A fast duplex service is maintained with Portland, the second antenna at the South San Francisco transmitting station being used for this purpose. It was found necessary at this station to use two antennas very nearly at right angles to each other, and two arcs for transmitting on two wave lengths simultaneously. There is no noticeable interference between transmitters and receivers at any of the stations.

Only one man is required at San Diego and at Phœnix, respectively. This man acts as operator and manager. He is always able, when receiving from Los Angeles, to "break" that station when it is necessary to answer the telephone, wait on a customer, or attend to other duties. The stations in each case are located near the center of the cities they serve.

In the operation of all circuits the methods of the wire companies have been followed to a great extent. Ex-wire operators are employed quite generally, and the operating officials are also ex-wire men. In the operation of the duplex circuits, the two stations are tuned in at the opening hour in the morning, after which there is no stop for tuning or calling. All business as it is filed is transmitted immediately. When it is necessary to "break", the sender is requested to re-transmit all material after the last word received, so that the receiver is able to fill the missing words before proceeding, and to turn out a complete message ready for immediate delivery.

For transmitting purposes, the sending machines described previously in this paper are used with few exceptions, and the speed of the circuits compares favorably with that of the fast wire circuits.

A simple form of amplifier for copying signals without the necessity for wearing head telephones has proven quite successful at Los Angeles in copying San Francisco in regular commercial work.

The Federal Telegraph Company is in active competition with the wire telegraph companies on the Pacific coast, furnishing a fast, reliable telegraph service throughout the entire year. Business is increasing daily and improvements are contemplated which will still further improve the service and the scope of the work.

The chief factor of success has been the ability to furnish clear, reliable signals for receiving, with a minimum expenditure of transmitted power, and with consequent low cost of operation. Good working conditions for employees, and the introduction of the latest time-saving features have also proven big factors in efficiency. Flexibility in power control and wave length regulation and the sharp tuning have assisted materially.

In the work of these stations, the matter of interference from extraneous noises has been shown to be more of a psychological than a material difficulty. An operator, trained to receive with outside disturbances present, listens only to the signals he wishes to copy, regardless of the fact that other noises around him may be considerably louder. Soundproof compartments for receiving have been demonstrated to be entirely unnecessary in this work.

The great value of the duplex system over the old style simplex station for high speed, direct work, has been the most striking feature. With the results of this work in view, the erection of simplex stations in the future, to handle any considerable amount of business, would seem to be an economic waste. In comparison a duplex radio circuit would seem to excel a simplex non-break installation in the proportion of about 3 to 1.

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FRANK S. PERRY, a telegraph operator of Greenfield, Mass., was taken to Pittsfield Aug., 28 by a deputy United States marshal, charged with violation of Federal laws in having transmitted a fraudulent telegram.

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# HISTORICAL DEVELOPMENT OF FIRE ALARM TELEGRAPHS

On June 3, 1845, the *Boston Advertiser* published a communication from Dr. W. F. Channing, in which public attention was called to a new application of the electric telegraph, introduced by S. F. B. Morse a year previously. Dr. Channing wrote: "There is a highly important application of the electro-magnetic telegraph to which public attention has not yet been directed. This is its use in our cities, to give an instantaneous, universal and definite alarm in case of fire. The peculiar properties of the telegraph—rapidity and precision of communication —are, in this instance, preeminently needed."

The writer then outlined his ideas on the subject substantially as follows: A central office was to be established in some public building in which the necessary battery, together with a Morse register and an alarm bell should be located; a double wire

CLARENCE R. GEORGE,
SECRETARY INTERNATIONAL ASSOCIATION OF MUNICIPAL ELECTRICIANS.

to proceed from that point over housetops successively to every engine house and fire bell in the city. In every station thus established, a Morse register in connection with an alarm bell was to be placed, also a key by the simple depression of which an appropriate signal would be instantly conveyed to every other station on the circuit.

He also suggested the modification of having five or six circuits, or even a circuit from every station, to the central office. By this method the operator would be able to communicate directly to all the stations, and if so desired every alarm of fire might be made to pass through the central office before being communicated to the various stations.

In the year 1897 Adam Bosch, then superintendent of fire alarm telegraphs in the city of Newark, N. J., prepared a historical account of the introduction of fire alarm telegraph systems, and what follows is drawn mainly from the data collected by Mr. Bosch.

In the year 1847, F. O. J. Smith, identified with early Morse telegraph interests, consulted with Moses G. Farmer, one of the foremost electricians of his time, in regard to the possibility of operating a number of large bells simultaneously by means of electricity. Farmer agreed to produce an apparatus by means of which this could be done, and within a short time exhibited to Smith a model of his invention, the simple and beautiful piece of mechanism which afterwards became well known as the falling-ball electro-magnetic escapement on a church-clock striking apparatus in common use

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PRESIDENT INTERNATIONAL ASSOCIATION OF MUNICIPAL ELECTRICIANS.

at that early date. Mr. Smith was highly pleased with the apparatus and immediately submitted a plan for establishing a fire alarm telegraph to Josiah Quincy, Jr., at that time Mayor of the city of Boston, Mass. This plan proposed connecting fifteen engine houses by telegraph, and equipping three large bells with electrical striking machines, the same to be operated simultaneously from some convenient point.

### FIRST FIRE ALARM IN BOSTON.

Upon the Mayor's recommendation the Board of Aldermen ordered two electric bell striking instruments for fire alarm purposes and the installation when made proved satisfactory.

In the year 1851 an appropriation of $10,000 was

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made by the city for this extension of the system. In the construction of the signal boxes the first departure from the original plans was made by adding a wheel and a crank to operate the key. This wheel had certain definite projections upon it, their width and position varying with the signal to be conveyed, the wide projections being for dashes, the others for dots. On turning the crank each projection of the wheel would in turn open the key and hold it open for a long or short period of time according to the width of the projection. The handle of the crank was weighted for the purpose of maintaining the wheel in its normal position where none of its projections were in contact with the key.

### THE FIRST CALL BOXES.

It was soon discovered that considerable skill was required to operate this device with any degree of regularity; the motion of the crank in unskilled hands was so irregular that the signals could not always be distinguished as printed by the register. This box was, therefore, discarded and other apparatus constructed with the same break wheel, but the crank was so aranged in connection with two gear-wheels that two revolutions of the crank were necessary to produce one revolution of the break wheel.

Considerable trouble was also experienced in the point of contact of the signal keys. This was remedied by substituting a sliding contact. In the original plan the signal box was designed simply to transmit the number of the district in which it was located. The improved box gave the number of the box itself, as well as the district number; the latter by dots and the box number by dashes and dots.

### LARGE BELLS USED.

The first alarm apparatus had bells weighing as much as 150 pounds; but the latter installations had bells weighing from 300 pounds each to as high as 3,700 pounds each. The public had for many years been trained to expect heavy blows on the fire bells such as was possible with the old tolling hammers, rope operated. To successfully operate the new electric bells, weights of from 800 to 2,000 pounds were found necessary.

### THE BELLS, THE BELLS.

The alarm bells with their accompanying apparatus had to be installed in belfries which were designed for gear of smaller proportions, and all of the experiments and tests had to be conducted with bells in place. Until the system was fairly perfected the citizens of Boston were kept in a state of excitement by the clanging of bells. Many people thought the new system was nothing short of a howling nuisance. Dr. Channing, who fortunately was a charming writer, was kept busy writing for the press in an effort to prevail upon the populace to withhold judgment until the new electric system was completely installed and in working order.

In one year the system was ready for service. Thirty-nine signal stations had been installed, the the total cost being $16,000. Mr. Farmer was elected the first superintendent of fire alarm in the city of Boston.

### PHILADELPHIA WAS NEXT.

In the year 1855, Dr. Channing, through a lecture on the subject of fire alarm telegraphs attracted the attention of J. N. Gamewell, and in that year the system was introduced in the city of Philadelphia. Mr. Gamewell went to Boston and secured the rights to the system in the territory of the western and southern states.

The fundamental patent covering the invention of the fire alarm telegraph was granted to Channing and Farmer, May 19, 1857.

### THE CLOCKWORK TRANSMITTER.

An important improvement in transmitters was made in the year 1856 by Charles T. Chester, to whom a patent was granted for an "automatic electrical circuit breaker." In this apparatus a break wheel was moved by means of clockwork actuated by a spring." This was, perhaps, the first automatic signal box invented.

### GAMEWELL'S SUCCESS.

Gamewell's company met with its first success in the city of St. Louis, Mo., where a plant was installed in the year 1858; St. Louis being the third city to adopt the electric fire alarm telegraph system.

In 1859 the Gamewell Company obtained by purchase complete control of all patents relating to the fire alarm telegraph granted to Channing and Farmer. In subsequent development work carried on by the company Mr. Gamewell was aided by Edwin Rogers, James M. Gardiner and Moses G. Crane.

The first fire alarm system equipped with the new automatic transmitter was installed in Mobile, Ala., in the year 1866.

The success of fire alarm telegraphs from that time forward was largely the result of improvements made by Mr. Gamewell and his technical assistants, and the present high standard maintained in the operation of such systems in practically every city, town and village in the United States and Canada, constitutes a tribute to the genius and painstaking efforts of these early engineers.

The largely attended gatherings of fire alarm superintendents at the annual conventions of the International Association of Municipal Electricians, clearly indicate the large growth of the science of fire alarm signaling.

This year's convention is to be held in Chicago, September 23-26; the meeting will be at the Auditorium Hotel.

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### The First Underground Fire-Alarm Telegraph Circuit in the United States.

J. P. Barrett, superintendent of the Chicago Fire Alarm Bureau, who died in December 1915, joined the Volunteer Fire Department in Chicago in the year 1853 and remained in the department until he retired as superintendent in 1897.

A few years before his death Mr. Barrett told the story of how and why the first underground fire alarm circuits were laid down in this country. He said:

"So you want to know something about the original underground system? Well, it was a bluff and I was called! In 1877 it was necessary to protect a certain district of Chicago with fire and police alarm boxes and in order to make the proper locations for apparatus I was compelled to run a line of poles through a part of what was, at that time, the most fashionable district of the city. I did this on Saturday night and Sunday morning, to avoid the injunction which was sure to come. On Monday morning a delegation of gentlemen from the fashionable district called on his Honor the Mayor and demanded the removal of the poles and also the scalp of the superintendent (your servant). I was ordered to appear before his Honor and the committee to explain the situation and the necessity for protection, also my duty in the premises and where the appropriation for that particular extension came from.

"After quite a lively discussion I was asked by the Mayor what I could do to relieve the pressure. I said that if I had sufficient funds at my disposal I would put the wires underground. One of the committee asked how much that would cost. After a short mental calculation I said I thought about $900 would do the work. We adjourned, but during the night I thought that possibly I had made a mistake about underground work. Sure enough, the next morning at 10 o'clock, one of the committee called and laid $900 in currency on my desk with the remark: "There! Now take down your —— poles!" I reported to his Honor the Mayor the receipt of the money and he replied: "I guess, John, you are up against it now." I was. I assure you that for a while I had to walk around.

"My first move was to secure the wire, which I got from Mr. Day—Kerite insulation it was. I next secured the necessary length of two-inch wrought iron pipe, reamed it out free of burrs, and then treated it to a bath of linseed oil and coal tar and dried it in the sunshine. I red-leaded the joints and drew the wires in and connected them up. It worked like a charm and is still working.

"Of course, electricians were not so numerous then as now, but those that were here were interviewed by the daily papers and their remarks were: Just wait until we have a thunderstorm and Barrett's underground line will go to pieces. Of course, I took all the precautions then available, even to securing an extra reel of wire and stationing a man at the nearest firehouse. Storms came and went and, as time passed, I concluded I was a fair authority on underground work myself. Committees and delegations visited and tested the work, the press discussed it and finally the Common Council passed a general ordinance covering the city lines.

"From then on you are familiar with the situation. The attorney for the Western Union Telegraph Company said to some one at the time that that —— piece of wire had raised more h—— than anything since the discovery of the telegraph."

### Will Y. Ellett

INJURED IN A FALL.

Will Y. Ellett, superintendent of the fire telegraph system of the Elmira, N. Y., fire department fell from a pole on August 22, a drop of twenty feet, and although he escaped serious injury has been confined to bed since that time.

Mr. Ellett had planned to have the eastern, and northern Pennsylvania members of the International Association of Municipal Electricians stop off a day at Elmira on their way to the Chicago convention. The chief regret he has in his personal misfortune is that his plans for entertainment are set aside, and it is doubtful that he will be able to attend the convention.

### New Western Union Telegraphic Code, Five-Letter Edition.

The New Western Union Telegraphic Code, Five-Letter Edition, has recently been placed on the market and the large sales of the book testify to its rapidly growing popularity. The business man needs this work, and when he sees it he instantly adopts it. The book contains 380,000 phrases, each phrase being represented by a five-letter word. These words are pronounceable singly or when two of them are joined together. The latter results in the saving of fifty per cent in cable tolls. The book weighs fifteen pounds, contains about 2,000 pages and measures thirteen inches in length by eleven inches wide, and is three and one-half inches thick. There is no waste space in the book. Every telegraph manager should call this book to the attention of his customers. The price is $30.00 per copy and it is on sale at the office of TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

### The Drawing of Plans and Diagrams.

An excellent book on the subject of engineering drawing is Engineer Draughtsmen's Work, a pocket size book of ninety-six pages which describes the use of drawing instruments; how to do sketching, designing, leveling and surveying; how to handle drawing paper, blue prints and tracings. The book also contains suggestions for the branches of scientific knowledge advisable to be studied by draughtsmen.

The price of the book is $1.00, and copies may be purchased from TELEGRAPH AND TELEPHONE AGE, 253 Brodway, New York.

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# INDUSTRIAL

P. K. CONDICT, recently made vice-president of the International Western Electric Company, in recognition of his service to the telephone and telegraph development in Japan, has had conferred upon him by that nation the Order of the Rising Sun, Fourth Class. The ceremony took place on July 17, at the official residence of the Minister of the Department of Communications, Tokyo.

GODFREY GORT, sales engineer with the L. S. Brach Mfg., Co., Newark, N. J., after covering a considerable amount of eastern territory reports that the new type of Brach vacuum lightning arrester is meeting with success under widely varying conditions.

THE HEMINGRAY GLASS COMPANY, manufacturers of telegraph and telephone insulators, on September 8, combined their various works and offices, with headquarters at Muncie, Indiana. R. G. Hemingray is president; A. C. Shinkle, vice-president, and W. E. Evans, secretary and treasurer of the company.

### Invention to the Rescue.

There never was a time in the history of the world when there existed a greater need for labor saving inventions than confronts us today. The necessity for greater production is imperative; the number of willing hands available to do the work is inadequate. The output of each day's work per man must be increased, and new invention holds out the only hope.

The Stine Screw Holes Company, of Waterbury, Conn., whose advertisement appears on another page of this issue of TELEGRAPH AND TELEPHONE AGE, is introducing a new, inexpensive aid to manufacture. Telegraph and telephone companies, in their cabinet work and carpenter work, pay men for boring by hand millions of holes each year.

The Stine screw holes are driven by means of an ordinary hammer in any material. The screw holes are made for wood screws or machine screws to fit all sizes of screws.

### Incandescent Electric Lamps.

INSPECTION BY THE BUREAU OF STANDARDS.

The total number of lamps offered for delivery to the Government purchasing authorities during the past fiscal year was over 5,000,000, of which about 600,000 were rejected on the initial inspection at the factory, which covers the mechanical qualities of the lamps and their rating in regard to power consumption and efficiency. In this initial inspection samples are selected for the burning or so-called life tests. During the year nearly 3,500 lamps were subjected to this life test, and with few exceptions the tungsten lamps, both vacuum and gas-filled, supplied under Government contracts, had a life considerably in excess of the 1,000 hours of burning required by the standard specifications.

At the request of the General Supply Committee, tests were made in connection with bids of various manufacturers for the contract for the next fiscal year, and a considerable range in quality among the lamps submitted was indicated. It is probable that the information obtained by these tests alone repays the total cost of the lamp work for the year.

### New Sawtooth Discharge Block.

Here is something to make the heart of the telephone trouble shooter dance with joy; to please the exchange manager by noticeably reducing complaints and to benefit the telephone using public by greatly reducing interruptions to telephone service.

Most telephone lines have several pairs of lightning arresters connected to them at various points in the exchange, in the cable terminals and at the subscribers' stations. Most of these lightning arresters are composed of carbon discharge blocks with mica separators. Frequently these lightning arresters interrupt telephone service by grounding the lines due to dusting and blistering of carbons, and to displacement of mica separators.

Here is a device designed to do away with all of these troubles. It is made so that it fits into existing lightning arresters and replaces the line carbon and separator of each arrester.

It operates just as sensitively as a carbon block lightning arrester with none of the latter's faults. The dielectric is fastened to the discharge block. The air gap is set permanently and does not depend upon the whims of the trouble man.

The cut shows the P 495 self-cleaning discharge block with carbon ground block ready for insertion in a lightning arrester. Carbon ground blocks of various shape and thickness adapt the discharge block to fit any lightning arrester which uses ⅜" x 1¼" carbon or copper blocks.

The device is manufactured by the Reliable Electric Company, and is the result of the pressing demand for self-cleaning discharge blocks to give the same service in cable terminals and main distributing frames, which this company has been giving for years in their series of self-cleaning sawtooth residence telephone protectors.

Look ahead! What you will be tomorrow depends on what you save today. Buy War Savings Stamps.

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# QUESTIONS AND ANSWERS

### Condensers in Cable Circuits.

G. H. H.—One method of signaling on a cable circuit operated simplex, without using sending condensers, is to connect a suitable shunt with inductive winding between the end of the cable conductor and the earth; a split battery should be used and the back contacts of the sending key insulated. The terminals of the battery are connected to the two levers of the keys and the closing contacts to the cable.

### Radio in Alaska.

R. E. W.—A paper read by A. H. Ginman before the Institute of Radio Engineers, New York, in 1916 and published in the Institute's Proceedings for June that year gives a good account of the radio stations operating in Alaska.

### Ecuador Telegraphs.

G. R. G.—The headquarters of the Guayaquil and Quito Railway is at Huigra, Ecuador, South America. The gentleman in charge of telegraph and telephone operation is M. W. Jones, whose address is Huigra.

### Fundamental Radio Equation.

W. C. H.—What is known as the fundamental equation of wireless telegraphy is

$$F = \frac{1}{2\pi \sqrt{L \times C}}$$

where F, is the frequency in cycles per second; L, the inductance in henries, and C, the capacity in farads. Or, the frequency is represented by 1 divided by the time of one complete oscillation — "period."

### First Typewriter in San Francisco.

A. C. F.—So far as records are obtainable it appears that the first telegrapher in San Francisco to use the typewriter in copying telegrams was George Denison,—that was in the early nineties of the past century. At that time Mr. Denison was in the service of the Postal Telegraph-Cable company. Another early user of the typewriter on the Pacific coast was B. S. Durkee, now chief operator for the Postal at Portland, Ore. Mr. Durkee was the first tournament prize winner in the use of the typewriter.

### Radio Questions.

M. J. J.—1. With a quenched gap it is necessary to have close coupling so that the energy of the closed circuit is rapidly taken up by the open circuit.

2. Loss of energy by radiation has the same effect upon the oscillations as losses due to ohmic resistance.

### Ardois Signal System.

A. W. C.—The Ardois signal system is used on American naval vessels, and consists of four double lanterns, each pair consisting of one white and one red globe, side by side. The lights are operated by means of a keyboard similar to that of an ordinary typewriter, or of a printing telegraph transmitter.

A red light represents a dot, and a white light a dash in forming the letters.

To signal the letter B, the lights show, reading from the top downward, white, three reds, using the symbols of the Continental telegraph alphabet.

### Capacty of Aerial.

R. C. T.—The capacity of the average amateur aerial of four wires ranges from .00025 to .002 microfarads.

### Wave Lengths.

J. J. L.—The oscillation constant is determined by extracting the square root of the capacity in microfarads times the inductance in centimeters. Wave length in feet is equal to the figure representing the oscillation constant multiplied by 195.56, and in meters is equal to the oscillation constant multiplied by 59.6.

### Telegraph Medals.

F. R. D.—At the Democratic National Convention held in Baltimore, Md., in 1912, when Mr. Wilson first was nominated, telegraph operators employed at the convention hall—about one hundred in number—were provided with a badge bearing bronze medallions of a symbolic character. On a bronze bar at the top were engraved the words "Telegraph Operator", and on a small disk suspended therefrom was a bas-relief of a telegraph key.

Similar badges have been distributed at other conventions.

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# Electro-Physics for the Telegraph, Telephone and Radio Student

No. 13.

In the two previous articles, Nos. 11 and 12, we dealt with the factors of the electric circuit, time-constant and harmonics. In order to apply the reasoning therein followed, in the present instalment we shall consider briefly the factors which determine the natural wave-length of a radio aerial.

An aerial when erected and in position has a natural wave length—a natural time period of vibration, which means, simply that a definite length of time is required in fractions of a second for an electric oscillation to complete its function in that particular aerial.

That time is

$$T = \sqrt{\frac{L \times C}{5{,}033{,}000}}$$

where L, the inductance, is expressed in centimeters, and C, the capacity, in microfarads.

A plain aerial, without tuning coils or condensers in circuit is said to possess distributed inductance and capacity, while an aerial connected through the primary coil of a tuner and with a condenser in circuit is said to have lumped capacity and inductance.

The inductance value of an aerial consists of the ability of the wire or wires to store up energy in the form of magnetic lines of force, and the capacity of the aerial consists of the ability of the wires to store energy in the form of electrostatic lines of force, in which latter case the aerial wire serves as one plate of the condenser and the earth as the other plate.

To determine the frequency of an aerial, where lumped capacity and inductance are present, the following formula is used

$$N = \frac{5{,}033{,}000}{\sqrt{L \times C}}$$

The frequency, N, is in cycles per second.

The relation between the frequency of the antenna current and the length of the wave radiated is expressed.

$$\lambda = \frac{V}{N}$$

where V represents the velocity of electromagnetic waves; 186,000 miles per second, or 300,000,000 meters per second.

In a given case where the frequency of the current in the antenna is 500,000 cycles per second, then the length of wave radiated from the antenna will be

$$\lambda = \frac{300{,}000{,}000}{500{,}000} = 600 \text{ meters.}$$

The customary amateur aerial with a natural wave length of 200 meters has an oscillation frequency of 1,500,000 cycles per second, and a time period of

$$\frac{1}{1{,}500{,}000} \text{ second.}$$

For,

$$\frac{300{,}000{,}000}{200} N = 1{,}500{,}000.$$

A wave length of 1,500 meters indicates a frequency of 200,000 oscillations per second. An oscillation frequency of the order of one million per second requires a spark frequency of about 200 per second. In radio transmitting sets employing disk dischargers of the synchronous type the spark frequency is about 300 per second.


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## SHOP TALK

### Switchboard Cords.

BY THE OBSERVER.

In September 1 instalment of this series of articles we mentioned that "Order is Heaven's first law." The observance of this law in telegraph operating room management yields rewards which are well worth striving for.

Consider, for instance, the lowly switchboard cord. In looking over switchboards, especially the old style boards, it will be found in some cases that table cords are stretched several feet so that they may be placed into their regular working circuit. Were the "reach" for one wire it might not appear so ugly; yet, not only is it for several wires, but the cords cross from right to left making in all a mess resembling driftwood after a flood.

The same condition may be seen in cases where the new type of board is employed, both jack and main line sections.

These cross-overs are occasioned by changing assignments. Of course, it is not always convenient to make permanent swaps of cords the moment changes are ordered, still there are many occasions when the proper swaps can be made so as to nestle cords directly under the wires that they are to work in. If these swaps are made from time to time the unsightliness will be forestalled, the amount of labor lessened, the general work at the board made easier, and certain it is that a new hand at the board will find his work less complicated and easier to perform.

Many of the younger men (students) express surprise that cords are used for loops and tables, especially on the pin-jack board. If the loops and tables were wired up permanently, and there should develop an "open" or any other sort of trouble, it would necessitate many times the labor of clearing the circuit as now is the case; because any defects in sets or loops may be removed from the main line simply by slipping the cord. In the absence of cords it would require unsoldering wires, pulling fuses, etc., before the particular drop carrying trouble could be located.

In considering changes of tables necessitating the swapping of cords it is possible there are too many changes made without sufficient reason for the change. When the work of installing an office is well under way the proper location of tables can easily be decided upon, and when so located changes should not be made without it being clear to everyone concerned that a change would be beneficial to the service. It takes time to become familiar with new arrangements. Changes result in confusion, even if only temporary.

It may be argued that no one can foretell when a large increment of business will develop necessitating moving a circuit nearer check clerks' positions. Quite true; but such situations are the exception and not the rule.

After encountering the conditions here presented one is reminded of the good wife who twice each month regularly shifts the home furniture with such disregard for custom that when the boss reaches home he is for a time in doubt as to whether or not he has turned in at the right number—indeed, believes that he is in foreign quarters until suddenly he recognizes the what-not and the parlor lamp.

The foregoing is a parallel picture to that presented to check clerks and others in an office where constant changes of tables are taking place.

Do not make changes until all of the factors have been considered.

### A New Kind of Telegraph Interference.

The list of obstructions, unattached property and wandering gear of one sort or another which have from the beginning of telegraph line operation been known to interfere with circuits, has had added to it one more commodity—hay, plain timothy hay.

Heretofore kite strings, branches and leaves of trees, guy-wires, birds' nests and barn doors about made up the list, but it has remained for a Canadian cyclone to appropriate hay stacks, whirl them through space and deposit them intact upon telegraph wires.

Traffic Superintendent Charles E. Davies, of the Great North Western Telegraph Company, Toronto, Ont., recently received a report from a terminal office in Quebec to the effect that the cause of an interruption to service was due to the power leads from the Seven Falls Power Company, which supply current to operate the motor generators in the Quebec office, being short circuited by an aviating hay stack which fouled the wires.

A high wind of cyclonic power picked up small stacks of cut hay from a field near the power line and deposited them high up among the wires, with the result that service was suspended until linemen armed with spurs and pitch-forks cleared the line.

If cyclones could be trained to deposit hay in wagon racks instead of on telegraph leads the farm labor problem would be in a fair way toward solution.

### "Mathematics for Engineers."

"Mathematics for Engineers" is the title of a work by W. N. Rose, which embraces all of the mathematics needed by engineers in practice and by students in all branches of engineering science. The work is in two volumes; the first carrying the studies through algebra, plane trigonometry, mensuration and graphs, the work being carefully graded from an elementary to an advanced stage. The second volume is devoted to the calculus and its applications, harmonics and vector analysis, spherical trigonometry, etc. Volume I contains 507 pages and is an excellent book for the telegraph and telephone engineer or student to possess, as the treatment of the subject of mathematics here worked out is from the engineer's standpoint.

The price of each volume is $6.00 and copies may be procured from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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## Municipal Electric Fire Alarm and Police Patrol Signaling Systems in the United States.

The Department of Commerce on September 1, issued a report covering the census of the electrical industries conducted for the year 1917. The report includes statistics showing the number of installations of municipal fire-alarm and police-patrol signaling systems in the United States.

The following is a condensed statement of the number of systems in operation in the various states:

| | Combined Fire-Alarm and Police-Patrol. | Fire-Alarm. | Police-Patrol. |
|---|---|---|---|
| Alabama | — | 7 | 3 |
| Connecticut | — | 41 | 15 |
| Arkansas | 1 | 2 | — |
| California | 2 | 76 | 17 |
| Colorado | — | 18 | 4 |
| Arizona | — | 7 | — |
| Delaware | 1 | — | — |
| District of Columbia | — | 1 | 1 |
| Florida | 1 | 14 | 4 |
| Georgia | — | 19 | 4 |
| Idaho | — | 8 | — |
| Illinois | 7 | 52 | 16 |
| Indiana | — | 43 | 13 |
| Iowa | — | 15 | 8 |
| Kansas | — | 5 | 1 |
| Kentucky | 1 | 16 | 6 |
| Louisiana | — | 11 | 1 |
| Maine | — | 50 | 8 |
| Maryland | — | 4 | 2 |
| Massachusetts | — | 140 | 54 |
| Michigan | 2 | 63 | 14 |
| Minnesota | 1 | 26 | 8 |
| Mississippi | — | 9 | — |
| Missouri | 2 | 3 | 2 |
| Montana | — | 9 | 2 |
| Nebraska | — | 3 | 2 |
| Nevada | — | 3 | 1 |
| New Hampshire | — | 36 | 5 |
| New Jersey | 2 | 87 | 37 |
| New Mexico | — | 2 | — |
| New York | 7 | 121 | 38 |
| North Corolina | — | 22 | 3 |
| North Dakota | — | 2 | 1 |
| Ohio | 2 | 55 | 30 |
| Oklahoma | 1 | 8 | 2 |
| Oregon | 1 | 10 | 1 |
| Pennsylvania | 11 | 128 | 34 |
| Rhode Island | — | 19 | 6 |
| South Carolina | — | 19 | 6 |
| South Dakota | — | 4 | 2 |
| Tennessee | — | 7 | 2 |
| Texas | — | 16 | 5 |
| Utah | — | 3 | 1 |
| Vermont | — | 23 | 3 |
| Virginia | — | 13 | 6 |
| Washington | — | 18 | 6 |
| West Virginia | — | 11 | 2 |
| Wisconsin | 3 | 35 | 11 |
| Wyoming | — | 6 | — |

Although there were 1,713 systems reported, they represent only 1,349 cities and towns. Of this number, 921 reported only fire-alarm systems and 19 reported only police-patrol systems; 364 reported as having both fire-alarm and police-patrol systems, and 45 having combined and interchangeable systems.

## Telegraphs and Telephones in Alsace-Lorraine.

The telegraph service in Alsace-Lorraine during the armistice was maintained by retaining in its entirety the organization previously existing.

Satisfactory working of the lines was attained three weeks after the French occupation, notwithstanding the fact that the Germans had removed all the circuits that were unimportant to their military needs, as well as most of the switchboards and subscribers' instruments. All circuits within the zone of fire were practically destroyed. The return of the German personnel commenced in February and was completed by April 5,—after the chiefs departed.

If You See a Message going to Society, Iowa, place it on the Soo City hook.

## Cable Codes.

TELEGRAPH AND TELEPHONE AGE is headquarters for all cable cipher codes. Telegraph managers would do well to bear this fact in mind when customers make inquiries regarding such codes. We are prepared to furnish full information on the subject, our knowledge being based on over thirty-five years' experience in handling the hundreds of codes on the market. Address TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

## OBITUARY.

### Death of Mrs. A. B. McMillan.

Mrs Elizabeth Mathews McMillan, the wife of A. B. McMillan, superintendent of the Commercial Cable Company's station at Far Rockaway, N. Y., died in Brooklyn, N. Y., August 30. Interment was on September 2 in Evergreen cemetery, Brooklyn.

Mrs. McMillan was born at Chester, England, in the year 1871, and was married and came to New York in 1890. She is survived by two sons and a sister in this country, and her father, a sister and two brothers in England.

Mrs. McMillan's father was for many years city surveyor of the ancient city of Chester, and is a recognized historian of that part of England.

MRS. DESNOUEE, the wife of Edouard Desnouee, superintendent of the Commercial Pacific Cable Company's station at San Francisco, Cal., died on September 2.

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# Telegraph and Telephone Age

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### Communication With South America.

One of the most interesting and most valuable developments of the Great War is that the people of North America and the people of South America have discovered each other.

For four hundred years the people of the two continents have known the existence of their neighbors, but except for trading purposes, which concerns only a comparatively small number of persons, the people in their homes on either continent have had no common interests with the people on the other.

Since the year 1882 there has been cable connection with South America, and although the traffic has increased steadily and the facilities have been improved, the lines of communication between North and South America directly have not been as numerous as the lines extending from South America to Europe direct and by way of African stations.

Viewing the present plans of the American cable and wireless telegraph companies, and of the press associations it appears that in the immediate future communication between the two continents is to be fostered by an increase in facilites and by a thoroughly organized exchange press service.

Already the fuller reports of South American happenings being supplied to our daily papers by the Associated Press are making us more familiar with South American geography.

The All-America Cables system linking New York with Bogota, Quito, Guayaquil, Lima, La Paz, Iquique, Valparaiso, Cordoba and Buenos Aires, is well equipped to take care of a large volume of the prospective additional traffic.

The Pan-American Wireless Telegraph Company has completed plans for the erection of radio stations at Caracas, Para, Pernambuco and Bahia on the east coast of South America.

It is not to be assumed that all of the good wishes, and the hopes for closer social relations are ours exclusively. As a sign of the visualization of coming events the telegraph employees in Argentina are collecting money to errect in Buenos Aires a handsome monument to the memory of Prof. S. F. B. Morse, the inventor of the telegraph, who was a citizen of the United States.

### The Messenger Boy.

"Telegram runner" would be a more appropriate and more dignified title for the lads who deliver and pick up the nation's telegrams, and it is a wonder that long ago some thought has not been devoted to devising a name more distinctive than "Messenger boy." A boy, or a man, wearing well pressed pants with stripes on them, and a visored cap bearing the name of a great telegraph company, through whose hands pass the lightning hurled correspondence of the world, has a right to regard with disdain ordinary ragamuffins who mail letters and do chores, and who are known as messenger boys.

A large proportion of the big men who today direct the operations and destinies of the telegraph companies were, in their youth, telegram runners, and most of these men are in sympathy with the boy's viewpoint, his desires, and his hopes.

Something should be done in a broad way to improve the status of the telegraph messenger: he is numerous—is the hope of the future.

In every telegraph office where ten or more messenger boys are employed there should be a well organized plan of boy-betterment in effect.

In an office where the messengers have a good opinion of the manager it is generally the case that the higher officials hold the same opinion.

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# CURRENT EVENTS

## EXECUTIVE OFFICE ANNOUNCEMENTS, PERSONAL MENTION, APPOINTMENTS

## PERSONAL.

### Charles C. Adams.

Charles C. Adams, vice-president of the Postal Telegraph-Cable Company, has resigned from the service and will in future devote his attention to private commercial interests.

President Clarence H. Mackay, in accepting Mr. Adams' resignation, said: "In accordance with your expressed desire I accept your resignation as of September 1. It is with genuine regret that I accept your resignation, because it means your withdrawal from the service of this company with which you have been so closely connected from its inception, and in whose ranks you have, through sheer ability and merit, risen from the bottom of the ladder to the position of vice-president and the trust that this implies. For your efforts, devotion, and loyalty to this company's interests I am very appreciative, and I most sincerely wish you God speed in your future career."

STERLING MORTON, president of the Morkrum Company, Chicago, was in New York on business September 17, 18 and 19.

JOHN HORN, at one time manager of the Western Union Telegraph Company's office in the New York Stock Exchange, and who now is in his eighty-fifth year, is living in retirement at No. 16 Fort Street, Montreal, Que. With the late James D. Reid, Mr. Horn was intimately identified with the project of erecting in Central Park, New York, the large and beautiful monument to the memory of S. F. B. Morse, which today stands as a credit to the telegraph profession.

F. D. GILES is motoring to Florida, where he will spend the winter.

EDWARD H. CURLETTE, well-known former telegrapher and now a member of the firm of H. L. Horton & Co., brokers, New York, has returned from an automobile trip to his old home at Napanee, Ont. He was accompanied by his family.

M. LEBAUGH, the well known old time telegrapher, has been for many years associated with the firm of Clark Dodge & Co., 51 Wall Street, New York.

PINKEY PERRIN, thirty years ago a well known telegrapher, and who, during the war, was in government service at Nitro, Pa., has returned to New York and is in business in the Wall Street district.

## WESTERN UNION TELEGRAPH COMPANY.

R. E. CHETWOOD, plant engineer, is away on his annual vacation.

GEORGE E. PALMER, division traffic supervisor, Chicago, has been transferred to New York as engineering assistant to the plant layout engineer.

LOUIS CASPER, of Vice-President Fashbaugh's office, New York, has returned from his annual vacation and is now in Washington on business of the company.

W. A. MCALLISTER, traffic superintendent, Central Cable Office, New York, has been appointed superintendent of accounting and clearing house of the Western Union Cable System, with headquarters at 62 Broadway. T. F. Foley, superintendent of the cable station at Far Rockaway, has been appointed traffic superintendent of the cable office to succeed Mr. McAllister.

A. P. ACHIMORE, engineer, general engineering department, New York, is spending his vacation at Eliott, Me.

C. C. MAXSON, general inspector of traffic service, has returned from his vacation, which he spent automobiling through nearby States.

R. W. WHITEHEAD, of Vice-President G. M. Yorke's department, is in San Francisco on business of the company.

W. S. STRAWBRIDGE, chief operator of the Dallas, Tex., office, has been appointed division traffic inspector, with headquarters at Dallas.

H. L. BROWNE has been appointed division traffic inspector at Dallas, Tex.

A. W. CRAIGHEAD, division wire chief at Dallas, Tex., has been appointed chief operator of the Dallas office.

W. J. JOHNSON, chief operator of the Houston, Tex., office, has been advanced to the position of division wire chief at Dallas, Tex.

F. B. WITT, Morse supervisor at Houston, Tex., has been advanced to the position of chief operator of that office.

J. M. HUDSON, formerly of the testing and regulating staff at Charlotte, N. C., was, on September

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1, appointed chief operator of the Greenville, S. C., office.

C. S. BRISCOE has been appointed chief operator of the Shreveport, La., office, vice R. N. Long transferred.

JOHN A. SCRUGGS, for several years manager of the Postal Telegraph-Cable Company's office at Danville, Va., on September 15, accepted the position of manager of the Western Union office at Danville. He succeeds W. C. Morrell, transferred to Portsmouth, Va.

O. C. FAUPEL has been transferred from Hartford, Conn., to the managership at Meriden, Conn.

C. A. CASSIDY, multiplex operator, Philadelphia, Pa., has been transferred to the Havana, Cuba, office as multiplex operator.

HARVEY S. MASON, for many years chief operator for the Postal Telegraph-Cable Company at Albany, N. Y., has resigned and accepted a position in the Albany office of the Western Union Telegraph Company.

## New York Western Union.

C. M. CAVANAUGH, assistant chief operator of automatics, New York main office, has been transferred to the testboard.

M. L. MOSELEY, division traffic inspector, Eastern Division, has been appointed assistant chief operator of automatics.

T. B. YARBOROUGH, the old time telegrapher, for many years identified with the repeater department of this office, and who six months ago was placed on a pension, has returned to the office temporarily. For the past five months he has traveled throughout the United States, going as far west as California.

THE ENTERTAINMENTS which have already taken place and which are on the program for the future, given by the Association of Western Union Educational Societies of the Eastern Division, are proving to be very popular with the employees. At the gatherings held in the building at No. 24 Walker Street, 500 members attend. The officers of the Association are S. B. Haig, president; C. C. Lever, vice-president, and F. A. Hoag, secretary-treasurer. T. M. Brennan, chairman of the Reception Committee, assisted by S. C. Crumpton, takes an active interest in promoting the entertainments.

MRS. S. C. CRUMPTON has returned from an extended trip to Southern points. Mrs. Crumpton was formerly Miss F. Keegan, in charge of the telephone bureau on the 17th floor, No. 24 Walker Street, New York.

B. S. SCHATZMAN, manager of one of the large Brooklyn branch offices, is spending his vacation at Chesterfield, Conn.

## Chicago Western Union.

THE WESTERN UNION FELLOWSHIP CLUB held its monthly banquet at the Fort Dearborn Hotel on Monday, September 15. The entertainment program was well planned and all present had a pleasant evening. Division Traffic Inspector Murphy's contribution to the entertainment was particularly well received.

A SILVER LOVING CUP donated by George E. Palmer was recently presented to the Chicago testing and regulating team, champions of the Western Union baseball league. Division Traffic Superintendent J. J. Welch made the presentation.

ERNEST A. BEHN, automatic attendant, has just undergone a serious operation at one of the Chicago hospitals. He is progressing favorably.

THOMAS C. HARLAN, division traffic inspector has had the good fortune to add a son to his family.

## St. Louis Branch Office Managers Meet.

On September 4, a meeting of the St. Louis, Mo., Western Union branch office managers was held in the Planters Hotel. The business sessions included addresses by A. D. Bradley, general manager, Omaha, Neb., A. C. Kaufman, of the traffic department, New York, and J. L. Ferciot, division commercial manager, Omaha, and Mrs. Leonore Rigdon of Omaha.

The entertainment was furnished by the Western Union Choral Club. F. A. Mohr acted as Toastmaster.

## Associaton of Western Union Employees.

CONVENTION AT DENVER.

The annual general assembly of the Association of Western Union Employees was held in Denver, Colo., September 1 to 10.

Delegates from all sections of the country attended the convention, and it is stated that much good has been accomplished in the way of plans for the future, including recommendations for improved schedules, classifications, working conditions, sickness and accident benefits, income sharing plan and co-operation between the company and the employees; all of which subjects will be discussed with the departmental and executive office heads at an early date.

For the following year the officers elected are: Joseph P. Hayes, president; James G. Hayes, general secretary and treasurer; P. F. Harrington, W. R. Reynolds, G. H. Campion, J. R. Melbourne, H. L. Esch, P. G. Tompkins, and H. M. Swartz, vice-presidents.

IN THE YEAR 1871, there were eighteen engineering schools in the United States with 117 yearly graduates.

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## POSTAL TELEGRAPH-CABLE COMPANY.

CLARENCE H. MACKAY sailed for Europe on September 18 in connection with cable matters. He expects to be abroad four or five weeks.

WILLIAM J. DEEGAN, secretary of the Mackay Companies, was in Washington recently, appearing before the Senate Committee on Commerce in opposition to the proposed government cable in the Pacific.

W. C. DAVIET, assistant to the general manager, will leave shortly on a general inspection trip through the east and west.

C. A. COMSTOCK, assistant to the general manager, is making an inspection trip through the south and middle west, visiting all of the more important offices.

J. F. SKIRROW has made several trips during the past few weeks in connection with the plant department.

J. J. CARDONA, assistant treasurer, is spending his vacation at the Delaware Water Gap.

M. A. MCCONNELL, of the general manager's office, has just returned to his desk after several weeks of recuperation.

E. P. TULLY, of the general manager's office, has spent several days in Boston and Philadelphia in the interest of the service.

A. B. PARRISH who, during the past year has been chief clerk to the superintendent of supplies, has been appointed chief clerk to W. B. Dunn, secretary of the company.

J. C. GEFVERT, has been appointed chief clerk to Warren S. Hallett, superintendent of supplies.

L. A. AULD has been appointed chief operator of the Butte, Mont., office.

S. S. LACY has been appointed chief operator of the Houston, Tex., office.

MANAGERS APPOINTED: E. C. Holland, Elgin, Ill.; Harry Giddings, San Bernardino, Calif.; A. M. Johnston, Missoula, Mont.; Fred Graziano, Baldwinsville, N. Y.; M. S. Lewis, Barstow, Calif.; R. J. Doty, Keokuk, Iowa; Margaret Olson, Grants Pass, Ore.; G. C. Furse, Eutaw, Ala.; H. B. White, Cotton Exchange branch, Houston, Tex.; D. E. Stevens, Fort Dodge, Iowa; R. R. Follen, Warrensburg, Mo.; T. K. Summerhill, Texarkana, Tex.; Douglas McCuller, Corinth, Miss.; E. B. Frazee, Cotton Exchange branch, Galveston, Tex.; A. B. Nebelsick, Lincoln, Neb.; Mrs. M. L. Leverett, Evanston, Ill.; L. M. Gross, Waukegan, Wis.; J. E. Johnson, Houston, Tex.; J. L. Keating, Cotton Exchange branch, Memphis, Tenn.

BRYANT W. FIELDS, whose transfer to San Francisco was noted in the September 16 issue of TELEGRAPH AND TELEPHONE AGE, has been appointed division electrical engineer of the Pacific Division, vice H. C. Shaw, appointed superintendent, First District. Mr. Fields like others recently appointed to important positions, is strictly a Postal product, having started as a messenger boy with the company, working up by his own energy and initiative to the position of chief operator at Kansas City, which position he held at the time of his transfer to San Francisco.

### Philadelphia Postal Notes.

THE COMPANY'S office at Hagerstown, Md., now occupies new quarters in the People's National Bank Building. The office is handsomely furnished in oak, a modern 20-wire switchboard, and additional telephones to handle the growing volume of business, have been installed.

The force consists of Charles W. Harman, manager, and F. R. Barger and Richard Rowe, operators; Benjamin Diehl, line foreman, and a number of messenger boys.

FOREMAN F. D. BOURKE, of Philadelphia, designed and supervised the installation of the office fixtures, and A. G. Carpenter, electrician, had charge of the electrical work.

THOSE who are away from the Philadelphia main office on their annual vacations include E. H. Locke, night traffic chief; J. A. Jeffries, chief service clerk; M. N. Redding, general traffic chief, and Miss Boyer, stenographer to Superintendent C. E. Bagley.

J. H. WILSON, manager, is enjoying his vacation at the seashore, and Messrs. H. M. Flood and Jerry Owens, of the manager's office, have returned from their annual outing.

H. F. ERNY, operator in the main office, has been transferred to the office at Broad and Fairmount Avenue, relieving Frank Dinan, who went to the office at 56 North 12th Street. Samuel Blank has been appointed operator at 630 Chestnut Street office.

AT THE recent thirty-fourth triennial conclave of the Knights Templars in Philadelphia, quite a number of Knights of the Key were among those who made up the big parade.

W. M. FITZGERALD, city foreman, was confined to his home recently on account of illness.

GEORGE ROSS, station lineman at Dover, Del., recently reported the cause of a case of line trouble as "An aeroplane fell on the line."

UPON HIS RETURN from America to England, in the year 1877, Sir. William Preece introduced in England the system of reading from the instrument by "sound", and also had the quadruplex system installed on British lines.

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THE telegraph office manager is the official father of his messenger staff.

In a degree he is responsible for the neat appearance of the boys and their ability to keep wheels and running gear in ship-shape order.

Right now your little group may be less than 100% efficient because of delays caused by faulty riding equipment.

Managers should advise boys to buy good tires. Make it plain that the best tires are the cheapest in the end, and that good equipment is a sure guarantee against break-downs and undelivered messages.

**United States Tires are Good Tires**

*U. S. Single Tube*

*Genuine G. & J. Clincher*

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## THE CABLE.

W. J. BLENHEIM, traffic manager, Western Union Cable System, New York, is spending his vacation in Canada.

WALTER CHARLES LIMBRICK has been appointed night chief operator in the office of the French Cable Company, 25 Broad Street, New York, succeeding William Giles, deceased. A notice of Mr. Giles' death appears elsewhere in this issue of TELEGRAPH AND TELEPHONE AGE.

LEONARD W. WILSON, night senior supervisor at the Western Union cable station at North Sydney, N. S., is spending his vacation in New York. He is accompanied by Mrs. Wilson.

JOHN SCOTLAND, for many years electrician at the Hearts Content, Newfoundland, cable station, died a few days ago while visiting friends near Montreal, Que. Mr. Scotland was for several years electrician at the St. Pierre, Miquelon, cable station.

THE CABLESHIP *Colonia* arrived at Rio de Janeiro on September 1, after completing the laying of a new cable from England by way of Ascension, St. Vincent, and Fayal.

M. E. DEMALVILAN, of the French Cable Company's staff in Haiti, has been transferred to the Company's office at 25 Broad Street, New York.

CABLEGRAMS in plain language, English or French, may now be sent to Riga, Russia. The rate from New York is 43 cents per word.

ON AND AFTER October 1, the cable rate via San Francisco and Commercial Pacific Cable, for ordinary cablegrams to Japan, will be reduced by twenty-five cents per word. The rate from New York will be one dollar and eight cents per word.

### Government Ownership.

Announcement is made from Japan that the government will not accept responsibility for any telegram to, or from, or through, Japanese telegraph and cable stations.

### Captain Combe of the "Restorer."

Captain Basil C. Combe, commander of the cableship *Restorer*, belonging to the Commercial Pacific Cable Company, first went to sea in the year 1883 as a cadet abroad the Thames Nautical Training Ship *Worcester*. From 1886 until 1892 he served as apprentice, second and first officer on four-masters sailing from British ports to America, Japan, China and Australia. His cableship experience began in 1892, as navigating officer on the *Silvertown*, and later the *Dacia*. Captain Combe has been in command of the *Restorer* since 1904. The *Restorer's* home port is Charleston, near Seattle, Wash., and its field of operation the Pacific ocean along the cable route between America and China.

### Cable Staff Changes.

EASTERN TELEGRAPH COMPANY: R. E. Holden, F. E. Pickering, R. A. K. Figg, J. P. Phillimore and H W. Verrall to Ascension; H E. Collings, C. H. Coates and G. F. Millington to Suez; J. K. Schroder, A. J. Lamb, C F. Matthews, W. C. Burrow, C. H. Hitchcock, W. O. Norfolk, R C. Short and D. W. Beattie to Durban; F. G. Ford and A. P. Organ to Zanzibar; E. W. Appleby to Delagoa Bay; L. F. Fox to Aden, and A. N. Swayne to Mozambique.

WESTERN TELEGRAPH COMPANY: M. C. Gove to Madeira; E. G. P. Kirby to Rio de Janeiro; W. R. Nosworthy to Montevideo; P. W. Miller, L. S. Dudfield, H. R. Wright and H. E. Bristowe to St. Vincent; A. L. R. Jones and D. W. Guy to Buenos Aires.

EASTERN EXTENSION TELEGRAPH COMPANY:. C. G. Darby, J. F. Bristed and J. K. Gibson to Sydney; W. Hudson, W. B. Elwes, E. S. Booth, R. A. Gowen, M. M. Stewart, J. H. Cockburn and R. J. Saunders to Singapore; R. W. Stort, H. G. Holmes and L. Webster to Melbourne; H. E. Edmonds and H. P. Flux to Darwin; R. B. W. Browning and F. S. Coote to Adelaide; A. H. L. Savage, B. T. Beckerleg and K. M. Campbell to Cocos; D. Farrant and E. W. Day to Hong Kong; T. A. Redfern to Batavia.

### Mexican Telegraph Company Earnings.

The income account of the Mexican Telegraph Company for the six months ended June 30, 1919, shows, gross revenue of $940,854; operating and general expenses $372,719; net earnings $568,135; other income $142,660; total income $710,795; Federal income and excess profits taxes $106,558; net income $604,237.

The surplus account for the six months ended June 30, 1919, shows surplus Dec. 31, 1918, $3,756,869; net profits six months ended June 30, last $604,237; total $4,361,106; dividends $249,760; surplus June 30, 1919, $4,111,346.

The gross income for the year ending Dec. 31, 1919, is estimated at $2,100,000 against $1,768,827 actual in the year ended Dec. 31, 1918.

The balance sheet as of June 30, last, shows cash amounting to $387,372; bills and accounts receivable $1,154,175; surplus $4,111,346 and total assets and liabilities of $10,552,938.

IN THE YEAR 1876, the first pneumatic tubes were laid underground between the main office of the Western Union Telegraph Company and the Stock Exchange building, New York.

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## RADIO TELEGRAPHY.

### Marconi Notes.

PRESIDENT GRIGGS has returned from a trip to the Canadian rockies, and Vancouver.

THE UNITED STATES SHIPPING BOARD has awarded to the Marconi Company a contract for the maintenance of wireless service on 400 vessels belonging to the Shipping Board.

THE NUMBER of American vessels on which the Marconi Company maintains wireless service is rapidly nearing the 1,000 mark.

THE CITY OFFICE of the Marconi Company in New York was removed, September 30, from No. 42 to 64 Broad Street at the corner of Beaver Street. The new quarters were recently vacated by the Central and South American Telegraph Company.

THE MARCONI INSTITUTE is running its day and evening classes to its capacity. There is an unprecendented demand for ship operators at $125 per month and found. The supply does not equal the demand.

E. E. BUCHER'S new book, "Wireless Experimenters' Manual," which has been anxiously awaited by amateurs, is just off the press.

### Independent Wireless Telegraph Company Notes.

P. R. MALLORY, president of the company, is spending his vacation at Grand Lake Stream, Me.

CHARLES J. PANNILL, general manager, has been in Washington the past week on business.

H. R. CHEETHAM, formerly with the Marconi Company, has joined the staff of the Independent Wireless Telegraph Company, as superintendent at Boston, Mass.

A. E. JACKSON has been transferred from Boston, Mass., to New Orleans, La., as division superintendent of the Gulf Division.

T. M. STEVENS, released from active duty in the Navy, has been appointed division superintendent for this company at San Francisco.

MILTON S. GOSS has joined the staff of this company and is stationed at Port Arthur.

THE COMPANY has received an order from the United States Shipping Board to maintain 400 vessels now operated by private shipping interests.

WITHIN THE PAST SIXTY DAYS more than 350 radio operators have secured employment with this company.

T. JOHNSON, JR., has been appointed chief expert radio aid, Bureau of Steam Engineering.

THIS COMPANY has opened a district office at Honolulu.

EMIL J. SIMON, of the Emil J. Simon Radio Engineering Company, sailed for Europe recently in connection with foreign radio development.

MISS CRIST, formerly with the Marconi Company, has entered the service of this company in the accounting department.

SEVERAL of the engineers in commercial telegraph service, who have recently set up radio receiving outfits in their homes in the vicinity of New York, are commenting on the need that appears to exist for a General Traffic Chief of the air. The hand sending of some of the radio operators under Navy control at shore and on ship stations is so erratic that the handling of traffic is far from efficient.

THOMAS H. TIERNEY, the first American operator employed by the Marconi Company for duty in this country, is now and has been for several years employed as wire chief in the main office of the Postal Telegraph-Cable Company, New York. Mr. Tierney was a member of the staff on the Nantucket Light Ship during "coherer" days.

SAIM SALIM, a Turkish telegrapher who has been in this country since 1913 studying land line telegraphy and radio, secured a first grade radio operator's license on September 10 and entered the service of the Independent Wireless Telegraph Company.

THE UNITED RADIO TELEGRAPHERS' ASSOCIATION, which was organized about two years ago, now has a membership of about seven hundred. To become a member of the Association it is necessary that applicants possess Government licenses as radio operators.

THE BRITISH EXPORT EMBARGO on radio telegraph and telephone apparatus and instruments was removed on September 11.

### British Marconi Company.

At a recent meeting in London of Marconi's Wireless Telegraph Company, Ltd., Godfrey Isaacs, deputy chairman and managing director, reported that the net profit from the company's operations during the past year was $2,691,000, which is approximately $967,000 more than the net profit for the year 1917. A dividend of 7 per cent. had already been declared on the preference shares, and an interim dividend of 5 per cent. on the ordinary shares. It is now proposed to pay a final dividend of 20 per cent. upon the ordinary shares and 15 per cent. on the preference shares.

### England-Holland-Scandinavia.

On September 3, radio telegraph service was established between Great Britain, Holland, and Scandinavia. Six hours daily are devoted by the Stonehaven radio station to transmitting to and receiving messages from Denmark, and six hours daily to communication with Holland.

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# METHOD OF CALCULATING THE CLASS AND NUMBER OF POLES REQUIRED FOR TELEGRAPH AND TELEPHONE LINES

BY STANLEY RHOADS.

The following method of calculating the class and number of poles for telegraph and telephone lines applies to straight a way (*i.e.*, "tangent") pole lines. Corners and terminals are special cases. Storm guys are assumed to strengthen and stiffen only the pole to which attached, and are designed to prevent swaying of the line; the line is designed with the desired factor of safety without them.

The formula for beams is used, because a pole is a beam fixed at one end. This formula says the strength, M, of a pole at any point is the maximum fibre stress, F, in tension required to rupture the material, multiplied by the moment of inertia, I, of the pole cross section, divided by the radius of pole, Y, at the point under consideration. Expressed as an equation, it is—

$$M = F \frac{I}{Y} \quad (1)$$

For a circle the moment of inertia

$$I \text{ is } \frac{\pi d^4}{64} \text{ and } Y = \frac{d}{2}$$

Substituting these in (1)

$$M = F \frac{\pi d^4}{64} \times \frac{1}{\frac{d}{2}} = F\pi \frac{d^3}{32} \quad (2)$$

If the fibre stress is given in pounds per square inch, and the radius in inches, formula (2) must be divided by 12, giving

$$M = F \frac{\pi d^3}{384} \quad (3)$$

and gives the strength in foot-pounds.

Wood poles are classed AA, A, B, C and D according to dimension of butt and top, and these classes are generally agreed upon among pole users. The Western Union Telegraph Company's tables of dimensions of the classes are frequently used. The strength of chestnut and eastern white cedar poles, of lengths from 20 to 45 feet, have been worked out and are shown in Table No. 1.

The usual practice is to calculate the strength of pole at the ground line. The force which puts the dangerous stress on the pole is the result of wind against the wires. This is maximum when the wires are covered with ice. The wind on the wires is assumed at right angles to the direction of the line and parallel to the ground.

It has been found, experimentally, that the wind pressure exerted on a wire is $0.0025\ V^2$ pounds per square foot of projected area of the wire, where V is the actual pressure. The projected area of a wire, one inch in diameter and a foot long, would be a flat area one inch by one foot. A maximum or gust wind velocity of 72 miles per hour is equivalent to an actual velocity of 56.6 miles per hour, and by this formula exerts a pressure of eight pounds per square foot of projected area. This, ordinarily, is the maximum wind pressure used in calculation. Other pressures assumed are six, four and two pounds per square inch, corresponding to 61.5, 49 and 33.5 miles per hour, respectively.

The records of ice coating on wires indicate it is common to have one-half inch radial thickness. Some places report three-quarters of an inch as frequently occurring. The half-inch is so much more widely reported as occurring that it has been generally used as the maximum. When weather conditions are such that ice coating occurs, the length of time the deposit continues determines the thickness of ice, and it seems proper to assume that it may continue long enough to make one-half inch, or it drops off immediately. When ice conditions occur, it is assumed they can continue until one-half inch accumulates. Therefore, the wires are assumed either coated with one-half inch or not coated at all.

The number of wires in railroad service is assumed to be equally divided between No. 9 AWG copper and No. 8 BWG iron wires. The diameters are averaged for the two, and with half inch ice and eight pound wind, is found to give a force of 0.76 pounds per lineal foot of wire. The pressure per foot on every wire is transferred to the pole. If all the wires are on the same arm, the load will be transferred to the pole at the arm through bolt. It is assumed that the arm braces do not assist. If two arms with an equal number of wires on each arm are used, the point of transfer of force or "center of force" will be half way between the arms. If an unequal number of wires are on the arms, each arm can be treated separately to obtain

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# STRENGTH OF VARIOUS SIZES AND CLASSES OF CHESTNUT AND EASTERN WHITE CEDAR POLES

## TABLE I

Modulus at any point = $\frac{\pi}{32} d^3$ Strength = $\left(\frac{\pi}{32} d^3\right)\frac{M}{12}$ M = Modulus of Rupture of Wood

| Pole Length | Class | Chestnut @ 5100# | | | | | | | | | | Eastern White Cedar @ 3600# | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Top | | 6' Butt | | Av. Taper | | At Ground | | Modulus at Grd. | Strength at Grd Ft. Lbs. | Top | | 6' Butt | | Av. Taper | | At Ground | | Modulus at Grd. | Strength at Grd. Ft. Lbs. |
| | | Cir. | Dia. | Cir. | Dia. | Cir. | Dia. | Cir. | Dia. | | | Cir. | Dia. | Cir. | Dia. | Cir. | Dia. | Cir. | Dia. | | |
| 20 | AA | 27.16 | 8.65 | 36 | 11.46 | 0.6320 | 0.2011 | 37.26 | 11.86 | 163.7 | 69,600 | 27.16 | 8.65 | 36 | 11.46 | 0.6320 | 0.2011 | 37.26 | 11.86 | 163.7 | 49100 |
| | A | 24 | 7.64 | 33 | 10.50 | 0.6428 | 0.2041 | 34.29 | 10.91 | 127.5 | 54,200 | 24 | 7.64 | 33 | 10.50 | 0.6425 | 0.2045 | 34.28 | 10.91 | 127.5 | 38200 |
| | B | 22 | 7.00 | 30 | 9.54 | 0.5735 | 0.1815 | 31.15 | 9.90 | 95.2 | 40,500 | 21 | 6.69 | 29 | 9.24 | 0.5716 | 0.1820 | 30.14 | 9.60 | 86.9 | 26100 |
| | C | 20 | 6.37 | 27 | 8.59 | 0.5000 | 0.1586 | 28.00 | 8.91 | 69.4 | 29,500 | 18¾ | 5.97 | 27 | 8.60 | 0.5090 | 0.1876 | 28.18 | 8.98 | 71.0 | 21300 |
| | D | 20 | 6.37 | 24 | 7.64 | 0.2858 | 0.0907 | 24.57 | 7.82 | 46.9 | 19,900 | 17¼ | 5.49 | 25½ | 8.12 | 0.5890 Assume | 0.1876 Assume | 26.68 | 8.50 | 60.2 | 18100 |
| 22 | AA | 25.90 | 8.25 | 36 | 11.46 | 0.6320 | 0.2011 | 36.95 | 11.76 | 159.7 | 67900 | 25.90 | 8.25 | 36 | 11.46 | 0.6320 | 0.2011 | 36.95 | 11.76 | 159.7 | 47900 |
| | A | 24 | 7.64 | 34 | 10.82 | 0.6250 | 0.1988 | 34.94 | 11.12 | 134.95 | 57400 | 24 | 7.64 | 34 | 10.82 | 0.6250 | 0.1990 | 34.94 | 11.12 | 134.95 | 40500 |
| | B | 22 | 7.00 | 31 | 9.87 | 0.5624 | 0.1794 | 31.84 | 10.14 | 102.3 | 43500 | 21 | 6.69 | 30 | 9.55 | 0.5621 | 0.1790 | 30.84 | 9.82 | 92.8 | 27800 |
| | C | 20 | 6.37 | 28½ | 9.07 | 0.5310 | 0.1687 | 29.90 | 9.52 | 79.4 | 33700 | 18¾ | 5.97 | 28½ | 9.07 | 0.6092 | 0.1944 | 29.42 | 9.37 | 80.7 | 24200 |
| | D | 20 | 6.37 | 25 | 7.96 | 0.3150 | 0.0994 | 25.47 | 8.11 | 52.3 | 22200 | 17¼ | 5.49 | 27 | 8.60 Assume | 0.6090 | 0.1938 | 27.91 | 8.89 | 68.9 | 20700 |
| 25 | AA | 27.33 | 8.71 | 40 | 12.73 | 0.6667 | 0.2122 | 40.67 | 12.94 | 212.5 | 90400 | 27.33 | 8.71 | 40 | 12.73 | 0.6667 | 0.2122 | 40.67 | 12.94 | 212.5 | 65700 |
| | A | 24 | 7.64 | 36 | 11.46 | 0.6320 | 0.2011 | 36.63 | 11.66 | 154.4 | 65600 | 24 | 7.64 | 36 | 11.46 | 0.6320 | 0.2011 | 36.63 | 11.66 | 154.4 | 46300 |
| | B | 22 | 7.00 | 33 | 10.50 | 0.5290 | 0.1841 | 33.53 | 10.68 | 119.7 | 50800 | 22 | 7.00 | 32 | 10.19 | 0.5260 | 0.1675 | 32.53 | 10.36 | 109.2 | 32700 |
| | C | 20 | 6.37 | 30 | 9.54 | 0.5264 | 0.1668 | 30.53 | 9.71 | 89.8 | 38200 | 18¾ | 5.97 | 30 | 9.55 | 0.5920 | 0.1886 | 30.59 | 9.74 | 90.6 | 27200 |
| | D | 20 | 6.37 | 27 | 8.59 | 0.3682 | 0.1168 | 27.37 | 8.71 | 64.8 | 27500 | 18¾ | 5.97 | 28 | 8.92 Assume | 0.4870 | 0.1550 | 28.49 | 9.08 | 73.5 | 22100 |
| 30 | AA | 27.28 | 8.68 | 43 | 13.70 | 0.6550 | 0.2088 | 43.33 | 13.80 | 257.8 | 109500 | 27.28 | 8.68 | 43 | 13.70 | 0.6554 | 0.2088 | 43.33 | 13.80 | 257.8 | 77400 |
| | A | 24 | 7.64 | 40 | 12.73 | 0.6667 | 0.2122 | 40.33 | 12.84 | 207.8 | 88300 | 24 | 7.64 | 40 | 12.73 | 0.6667 | 0.2122 | 40.33 | 12.84 | 207.8 | 62300 |
| | B | 22 | 7.00 | 36 | 11.46 | 0.5835 | 0.1858 | 36.29 | 11.55 | 150.8 | 64100 | 22 | 7.00 | 36 | 11.46 | 0.5840 | 0.1858 | 36.29 | 11.54 | 150.8 | 45300 |
| | C | 20 | 6.37 | 33 | 10.50 | 0.5416 | 0.1720 | 33.27 | 10.59 | 116.5 | 49500 | 18¾ | 5.97 | 33 | 10.50 | 0.5940 | 0.1891 | 33.30 | 10.59 | 116.5 | 35000 |
| | D | 20 | 6.37 | 31 | 9.87 | 0.4582 | 0.1458 | 31.23 | 9.94 | 96.4 | 41000 | 18¾ | 5.97 | 31 | 9.87 Assume | 0.5104 | 0.1625 | 31.26 | 9.95 | 96.6 | 29000 |
| 35 | AA | 27.09 | 8.62 | 45 | 14.33 | 0.6180 | 0.1968 | 45.00 | 14.33 | 288.8 | 122700 | 27.38 | 8.72 | 47 | 14.97 | 0.6764 | 0.2153 | 47 | 14.97 | 330. | 140300 |
| | A | 24 | 7.64 | 43 | 13.70 | 0.6550 | 0.2086 | 43.00 | 13.70 | 252.7 | 107300 | 24 | 7.64 | 43 | 13.70 | 0.6550 | 0.2089 | 43 | 13.70 | 252.7 | 102700 |
| | B | 22 | 7.00 | 40 | 12.73 | 0.6202 | 0.1975 | 40.00 | 12.73 | 203 | 86300 | 22 | 7.00 | 38 | 12.10 | 0.5518 | 0.1758 | 38 | 12.10 | 174.0 | 74000 |
| | C | 20 | 6.37 | 36 | 11.46 | 0.5510 | 0.1755 | 36.00 | 11.46 | 147.6 | 62800 | 18¾ | 5.97 | 36 | 11.46 | 0.5950 | 0.1892 | 36 | 11.46 | 147.0 | 62800 |
| | D | 20 | 6.37 | 35 | 11.14 | 0.5170 | 0.1645 | 35.00 | 11.14 | 136.2 | 58000 | 18¾ | 5.97 | 34 | 10.82 Assume | 0.5260 | 0.1674 | 34 | 10.82 | 124.5 | 53000 |
| 40 | AA | 27.08 | 8.62 | 48 | 15.28 | 0.6154 | 0.1958 | 48.00 | 15.28 | 350.0 | 148800 | 27.33 | 8.70 | 50 | 15.92 | 0.6667 | 0.2122 | 50 | 15.92 | 396.0 | 168300 |
| | A | 24 | 7.64 | 45 | 14.33 | 0.6180 | 0.1967 | 45.00 | 14.33 | 288.8 | 122700 | 24 | 7.64 | 47 | 14.97 | 0.6764 | 0.2153 | 47 | 14.97 | 330.0 | 143200 |
| | B | 22 | 7.00 | 43 | 13.70 | 0.6179 | 0.1970 | 43.00 | 13.70 | 252.7 | 107300 | 22 | 7.00 | 43 | 13.70 | 0.6177 | 0.1968 | 43 | 13.70 | 252.7 | 107380 |
| | C | 20 | 6.37 | 40 | 12.73 | 0.5880 | 0.1869 | 40.00 | 12.73 | 203.6 | 86300 | 18¾ | 5.97 | 40 | 12.73 | 0.6250 | 0.1988 | 40 | 12.73 | 201.5 | 86000 |
| | D | 20 | 6.37 | 39 | 12.42 | 0.5588 | 0.1779 | 39.00 | 12.42 | 188.0 | 79900 | 18¾ | 5.97 | 37 | 11.78 Assume | 0.5368 | 0.1709 | 37 | 11.78 | 160.0 | 68100 |
| 45 | AA | 27.07 | 8.62 | 51 | 16.24 | 0.6140 | 0.1953 | 50.69 | 16.14 | 412.5 | 175200 | 27.30 | 8.69 | 53 | 16.88 | 0.6592 | 0.2100 | 52.67 | 16.77 | 463.0 | 197000 |
| | A | 24 | 7.64 | 48 | 15.28 | 0.6155 | 0.1958 | 47.69 | 15.18 | 343.3 | 146000 | 24 | 7.64 | 50 | 15.92 | 0.6667 | 0.2122 | 49.67 | 15.82 | 390.0 | 166000 |
| | B | 22 | 7.00 | 47 | 14.97 | 0.6410 | 0.2042 | 46.68 | 14.87 | 324.0 | 137500 | 22 | 7.00 | 47 | 14.97 | 0.6408 | 0.2040 | 46.68 | 14.87 | 323.0 | 137200 |
| | C | 20 | 6.37 | 43 | 13.70 | 0.5897 | 0.1876 | 42.71 | 13.61 | 247.0 | 104900 | 18¾ | 5.97 | 43 | 13.70 | 0.6217 | 0.1982 | 42.69 | 13.60 | 247.0 | 104800 |

ASSUMED DEPTH OF SETTING POLES

| | | | |
|---|---|---|---|
| 20' | Pole | Set | 4'-0" Deep |
| 22' | " | " | 4'-6" " |
| 25' | " | " | 5'-0" " |
| 30' | " | " | 5'-6" " |
| 35' | " | " | 6'-0" " |
| 40' | " | " | 6'-0" " |
| 45' | " | " | 6'-6" " |

ASSUMED LENGTHS OF POLES REQUIRED FOR DIFFERENT NUMBERS OF WIRES

| | | |
|---|---|---|
| 6 Wires | Requires | 20' Pole |
| 10 | " | 20' " |
| 20 | " | 20' " |
| 30 | " | 20' " |
| 40 | " | 22' " |
| 50 | " | 25' " |
| 60 | " | 30' " |

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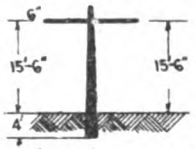
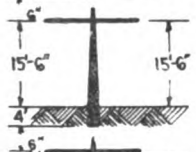
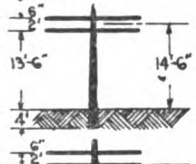
WIND PRESSURE ON WIRES
$0.0025V^2 = 0.0025 \times 56.6^2 = 8.0$
Dia #9 A.W.G. Wire = 0.110"
Dia. ½ inch Ice = 1.000"
Aera per ft. Length Wire = 1.110 X 12 = 13.32 sq in
Pressure per ft. Length Wire = 9 x 13.32 / 144 = 0.743 #/ft
Pressure Similarly for #8 B.W.G. = 0.778 #/ft
Average = (0.778 + 0.743) / 2 = 0.760 #/ft
Pressure per wire per span = 52.8 x 0.76 = 40.10 #




6 WIRES
20' POLES
MOMENT EQUALS
6 X 15'-6" X 40.10 =
3730 FT.-LBS.




10 WIRES
20' POLES
MOMENT EQUALS
10 X 15'-6" X 40.10 =
6,220 FT.-LBS.




20 WIRES
20' POLES
MOMENT EQUALS
20 X 14'-6" X 40.10 =
11,625 FT.-LBS.

30 WIRES
20' POLES
MOMENT EQUALS
30 X 13'-6" X 40.10 =
16,250 FT.-LBS.

40 WIRES
22' POLES
MOMENT EQUALS
40 X 14'-0" X 40.10 =
23,500 FT.-LBS.

50 WIRES
25' POLES
MOMENT EQUALS
50 X 15'-6" X 40.10 =
31,600 FT.-LBS.

60 WIRES
30' POLES
MOMENT EQUALS
60 X 19'-0" X 40.10 =
45,700 FT.-LBS.

## BASE TABLES FACTOR OF SAFETY FOR 100 POLES PER MILE = 52.8' CENTER TO CENTER

## ALSO NUMBER OF POLES PER MILE FOR FACTOR OF SAFETY OF 3

Computations for 8# Wind. Other Rates by Proportioning.

### TABLE II
### CHESTNUT

| CLASS POLE | 8# Wind. Factor of Safety | 8# Wind. Poles per Mi. F.S. 3 | 6# Wind. Factor of Safety | 6# Wind. Poles per Mi. F.S. 3 | 4# Wind. Factor of Safety | 4# Wind. Poles per Mi. F.S. 3 | 2# Wind. Factor of Safety | 2# Wind. Poles per Mi. F.S. 3 |
|---|---|---|---|---|---|---|---|---|
| AA | 18.7 | 16 | 24.9 | 12 | 37.4 | 8 | 74.8 | 4 |
| A | 14.5 | 21 | 19.2 | 16 | 29. | 10 | 58. | 5 |
| B | 10.9 | 28 | 14.5 | 21 | 21.8 | 14 | 43.6 | 7 |
| C | 7.91 | 38 | 10.5 | 29 | 15.82 | 19 | 31.64 | 10 |
| D | 5.33 | 57 | 7.11 | 43 | 10.66 | 28 | 21.32 | 14 |
| | | | | | | | | |
| AA | 11.20 | 27 | 14.92 | 20 | 22.40 | 14 | 44.80 | 7 |
| A | 8.71 | 36 | 11.60 | 26 | 17.42 | 17 | 34.82 | 9 |
| B | 6.51 | 46 | 8.69 | 35 | 13.02 | 22 | 26.04 | 12 |
| C | 4.74 | 64 | 6.32 | 48 | 9.48 | 32 | 18.96 | 16 |
| D | 3.20 | 94 | 4.27 | 70 | 6.40 | 47 | 12.80 | 24 |
| | | | | | | | | |
| AA | 5.99 | 50 | 7.99 | 38 | 11.98 | 25 | 23.96 | 13 |
| A | 4.66 | 65 | 6.21 | 49 | 9.32 | 32 | 18.64 | 16 |
| B | 3.48 | 86 | 4.64 | 65 | 6.96 | 43 | 13.92 | 22 |
| C | 2.54 | 118 | 3.39 | 90 | 5.08 | 59 | 10.16 | 30 |
| D | 1.71 | 176 | 2.28 | 132 | 3.42 | 88 | 6.84 | 44 |
| | | | | | | | | |
| AA | 4.28 | 70 | 5.71 | 53 | 8.56 | 35 | 17.12 | 18 |
| A | 3.33 | 90 | 4.44 | 68 | 6.66 | 45 | 13.32 | 23 |
| B | 2.49 | 120 | 3.32 | 90 | 4.98 | 60 | 9.96 | 30 |
| C | 1.81 | 166 | 2.41 | 124 | 3.62 | 83 | 7.24 | 42 |
| D | 1.22 | 246 | 1.63 | 184 | 2.44 | 123 | 4.88 | 62 |
| | | | | | | | | |
| AA | 3.02 | 99 | 4.02 | 75 | 6.04 | 50 | 12.08 | 25 |
| A | 2.55 | 118 | 3.40 | 88 | 5.10 | 59 | 10.20 | 29 |
| B | 1.93 | 156 | 2.57 | 118 | 3.86 | 78 | 7.72 | 39 |
| C | 1.50 | 200 | 2.00 | 150 | 3.00 | 100 | 6.00 | 50 |
| D | .99 | 303 | 1.32 | 228 | 1.98 | 152 | 3.96 | 76 |
| | | | | | | | | |
| AA | 2.91 | 103 | 3.88 | 77 | 5.82 | 52 | 11.64 | 26 |
| A | 2.11 | 142 | 2.81 | 108 | 4.22 | 71 | 8.44 | 36 |
| B | 1.65 | 184 | 2.17 | 138 | 3.26 | 92 | 6.52 | 46 |
| C | 1.23 | 244 | 1.64 | 184 | 2.46 | 122 | 4.92 | 61 |
| D | .88 | 341 | 1.17 | 256 | 1.76 | 170 | 3.52 | 85 |
| | | | | | | | | |
| AA | 2.40 | 125 | 3.20 | 94 | 4.80 | 63 | 9.60 | 32 |
| A | 1.93 | 156 | 2.57 | 117 | 3.86 | 78 | 7.72 | 39 |
| B | 1.40 | 214 | 1.87 | 160 | 2.80 | 107 | 5.60 | 54 |
| C | 1.08 | 278 | 1.44 | 208 | 2.16 | 140 | 4.32 | 70 |
| D | .90 | 334 | 1.20 | 250 | 1.80 | 167 | 3.60 | 83 |

### TABLE III
### EASTERN WHITE CEDAR.

| CLASS POLE | 8# Wind Factor of Safety | 8# Wind Poles per Mi. F.S. 3 | 6# Wind Factor of Safety | 6# Wind Poles per Mi. F.S. 3 | 4# Wind Factor of Safety | 4# Wind Poles per Mi. F.S. 3 | 2# Wind Factor of Safety | 2# Wind Poles per Mi. F.S. 3 |
|---|---|---|---|---|---|---|---|---|
| AA | 13. | 23 | 17.3 | 18 | 26 | 12 | 52, | 6 |
| A | 10.12 | 30 | 13.5 | 23 | 20.24 | 15 | 40.48 | 8 |
| B | 7. | 43 | 9.34 | 33 | 14. | 22 | 28. | 11 |
| C | 5.71 | 53 | 7.61 | 40 | 11.42 | 27 | 22.84 | 14 |
| D | 4.86 | 62 | 6.48 | 47 | 9.72 | 31 | 19.44 | 16 |
| | | | | | | | | |
| AA | 7.89 | 38 | 10.51 | 29 | 15.78 | 19 | 31.56 | 10 |
| A | 6.14 | 49 | 8.18 | 37 | 12.28 | 25 | 24.56 | 12 |
| B | 4.20 | 72 | 5.60 | 54 | 8.40 | 36 | 16.80 | 18 |
| C | 3.42 | 88 | 4.56 | 66 | 6.84 | 44 | 16.68 | 22 |
| D | 2.91 | | 3.88 | | 5.82 | 52 | 11.64 | 26 |
| | | | | | | | | |
| AA | 4.22 | 71 | 5.62 | 53 | 8.44 | 36 | 16.88 | 18 |
| A | 3.28 | 92 | 4.37 | 69 | 6.56 | 46 | 13.12 | 23 |
| B | 2.24 | 134 | 2.99 | 100 | 4.48 | 67 | 8.96 | 34 |
| C | 1.83 | 164 | 2.44 | 123 | 3.66 | 82 | 7.32 | 41 |
| D | 1.56 | | 2.08 | | 3.12 | 96 | 6.24 | 48 |
| | | | | | | | | |
| AA | 3.02 | 100 | 4.03 | 75 | 6.04 | 50 | 12.08 | 25 |
| A | 2.35 | 128 | 3.13 | 96 | 4.70 | 64 | 9.40 | 32 |
| B | 1.61 | 186 | 2.15 | 140 | 3.22 | 93 | 6.44 | 41 |
| C | 1.31 | 229 | 1.75 | 172 | 2.62 | 115 | 5.24 | 57 |
| D | 1.11 | | 1.48 | | 2.22 | 135 | 4.44 | 68 |
| | | | | | | | | |
| AA | 2.13 | 141 | 2.84 | 106 | 4.26 | 71 | 8.52 | 35 |
| A | 1.80 | 167 | 2.40 | 125 | 3.60 | 84 | 7.20 | 42 |
| B | 1.23 | 244 | 1.64 | 183 | 2.46 | 122 | 4.92 | 61 |
| C | 1.08 | 278 | 1.44 | 208 | 2.16 | 139 | 4.32 | 70 |
| D | .92 | | 1.23 | | 1.84 | 163 | 3.68 | 82 |
| | | | | | | | | |
| AA | 2.05 | 146 | 2.73 | 110 | 4.10 | 73 | 8.20 | 37 |
| A | 1.49 | 200 | 1.98 | 152 | 2.98 | 100 | 5.96 | 50 |
| B | 1.05 | 286 | 1.40 | 214 | 2.10 | 143 | 4.20 | 72 |
| C | .88 | 341 | 1.17 | 256 | 1.76 | 170 | 3.52 | 85 |
| D | .71 | | .95 | | 1.42 | 211 | 2.84 | 106 |
| | | | | | | | | |
| AA | 1.69 | 178 | 2.25 | 134 | 3.38 | 89 | 6.76 | 45 |
| A | 1.36 | 222 | 1.81 | 166 | 2.72 | 111 | 5.44 | 55 |
| B | .99 | 303 | 1.32 | 227 | 1.98 | 152 | 3.96 | 76 |
| C | .77 | 390 | 1.02 | 294 | 1.54 | 195 | 3.08 | 98 |
| D | .64 | | .95 | | 1.28 | 234 | 2.56 | 117 |

NOTE: Calculations are based on the following data and assumptions.
1. Wire Load: 50% No. 9 A.W.G. Copper and 50% No. 8 B.W.G. Iron.
2. Ice Load: Coating on conductors ½" inch thick.
3. Wind Pressure on Poles: Not taken into consideration. If wind pressure on poles is taken account of, the Factor of safety will be reduced about 5% for 10 wire loads to 10% for 4 wire loads.
4. Pole Strength: Figured from minimun specification requirements of present W.U. specifications.
5. Modulus of Rupture: Chestnut, 5,100 pounds per square inch. Eastern White Cedar, 3,600 pounds per square inch.
6. In obtaining wind data use velocity of fastest mile.

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# EXACT NUMBER OF POLES PER MILE AND CLASSES OF POLES FOR DIFFERENT WIRE AND ICE LOADING SUBJECTED TO DIFFERENT WIND PRESSURES, FOR TELEGRAPH AND TELEPHONE POLE LINES ALONG RAILROADS

## TABLE IV

Factor of Safety of 2 — ½" Ice Coating on Wires.

| No. of Wires | Class Pole | 8th Wind = 72 Mi. Velocity | | 6th Wind = 61.5 Mi. Velocity | | 4th Wind = 49 Mi. Velocity | | 2nd Wind = 33.5 Mi. Velocity | |
|---|---|---|---|---|---|---|---|---|---|
| | | No. of Poles per Mile | | No. of Poles per Mile | | No. of Poles per Mile. | | No. of Poles per Mile. | |
| | | Eastern White Cedar | Chestnut | Eastern White Cedar | Chestnut | Eastern White Cedar | Chestnut | Eastern White Cedar | Chestnut |
| 6 | AA | 16 | 11 | 12 | 8 | 8 | 6 | 4 | 3 |
| | A | 20 | 14 | 16 | 11 | 10 | 7 | 6 | 4 |
| | B | 29 | 19 | 22 | 14 | 15 | 8 | 8 | 5 |
| | C | 36 | 26 | 27 | 20 | 18 | 13 | 10 | 7 |
| | D | 42 | 36 | 32 | 29 | 21 | 19 | 11 | 8 |
| 10 | AA | 26 | 18 | 19 | 14 | 13 | 9 | 7 | 5 |
| | A | 38 | 23 | 25 | 18 | 17 | 12 | 9 | 6 |
| | B | 48 | 31 | 36 | 23 | 24 | 16 | 12 | 8 |
| | C | 58 | 43 | 44 | 32 | 30 | 21 | 15 | 11 |
| | D | 69 | 63 | 53 | 47 | 36 | 31 | 18 | 16 |
| 20 | AA | 48 | 34 | 36 | 25 | 24 | 17 | 12 | 9 |
| | A | 61 | 43 | 46 | 33 | 31 | 22 | 16 | 11 |
| | B | 90 | 58 | 67 | 43 | 45 | 29 | 23 | 15 |
| | C | 109 | 79 | 82 | 51 | 55 | 40 | 28 | 20 |
| | D | 128 | 112 | 97 | 88 | 68 | 59 | 32 | 30 |
| 30 | AA | 67 | 47 | 50 | 35 | 39 | 24 | 17 | 12 |
| | A | 86 | 61 | 64 | 45 | 43 | 30 | 22 | 15 |
| | B | 125 | 81 | 94 | 61 | 63 | 41 | 32 | 21 |
| | C | 153 | 111 | 115 | 83 | 77 | 56 | 39 | 28 |
| | D | 180 | 164 | 136 | 123 | 90 | 82 | 116 | 41 |
| 40 | AA | 94 | 68 | 71 | 50 | 47 | 34 | 24 | 17 |
| | A | 111 | 79 | 84 | 58 | 56 | 40 | 25 | 20 |
| | B | 163 | 104 | 122 | 76 | 82 | 52 | 41 | 26 |
| | C | 185 | 133 | 139 | 100 | 93 | 67 | 47 | 34 |
| | D | 218 | 202 | 163 | 152 | 109 | 101 | 85 | 51 |
| 50 | AA | 98 | 69 | 74 | 52 | 49 | 35 | 25 | 18 |
| | A | 135 | 96 | 101 | 74 | 68 | 48 | 34 | 24 |
| | B | 191 | 123 | 143 | 93 | 96 | 62 | 48 | 31 |
| | C | 228 | 184 | 171 | 122 | 114 | 82 | 57 | 41 |
| | D | 282 | 228 | 211 | 171 | 141 | 114 | 71 | 57 |
| 60 | AA | 119 | 84 | 88 | 63 | 61 | 42 | 30 | 21 |
| | A | 147 | 104 | 111 | 78 | 74 | 52 | 37 | 26 |
| | B | 202 | 143 | 152 | 108 | 101 | 72 | 51 | 36 |
| | C | 260 | 185 | 197 | 139 | 130 | 93 | 65 | 47 |
| | D | 322 | 223 | 211 | 167 | 157 | 111 | 79 | 56 |

## TABLE V

Factor of Safety of 3

| No. of Wires | Class Pole | 8th Wind = 72 Mi. Velocity | | 6th Wind = 61.5 Mi. Velocity | | 4th Wind = 49 Mi. Velocity | | 2nd Wind = 33.5 Mi. Velocity | |
|---|---|---|---|---|---|---|---|---|---|
| | | No. of Poles per Mile | | No. of Poles per Mile | | No. of Poles per Mile | | No. of Poles per Mile | |
| | | Eastern White Cedar | Chestnut | Eastern White Cedar | Chestnut | Eastern White Cedar | Chestnut | Eastern White Cedar | Chestnut |
| 6 | AA | 23 | 16 | 18 | 12 | 12 | 8 | 6 | 4 |
| | A | 30 | 21 | 23 | 16 | 15 | 10 | 8 | 5 |
| | B | 43 | 28 | 33 | 21 | 22 | 14 | 11 | 7 |
| | C | 53 | 38 | 40 | 29 | 27 | 19 | 14 | 10 |
| | D | 62 | 57 | 47 | 43 | 31 | 28 | 16 | 14 |
| 10 | AA | 38 | 27 | 29 | 20 | 19 | 14 | 10 | 7 |
| | A | 49 | 36 | 37 | 26 | 25 | 17 | 12 | 9 |
| | B | 72 | 46 | 54 | 35 | 36 | 23 | 18 | 12 |
| | C | 86 | 64 | 66 | 48 | 44 | 32 | 22 | 16 |
| | D | | 84 | | 70 | 52 | 47 | 25 | 25 |
| 20 | AA | 71 | 50 | 53 | 38 | 36 | 25 | 18 | 13 |
| | A | 92 | 65 | 69 | 49 | 46 | 32 | 23 | 15 |
| | B | 134 | 86 | 100 | 65 | 67 | 43 | 34 | 22 |
| | C | 164 | 118 | 123 | 90 | 82 | 59 | 40 | 30 |
| | D | | 176 | | 132 | 96 | 88 | 46 | 44 |
| 30 | AA | 100 | 70 | 75 | 53 | 50 | 35 | 25 | 18 |
| | A | 128 | 90 | 96 | 68 | 64 | 45 | 32 | 25 |
| | B | 186 | 120 | 140 | 90 | 93 | 60 | 47 | 30 |
| | C | 229 | 166 | 172 | 124 | 115 | 83 | 57 | 42 |
| | D | | 246 | | 184 | 135 | 123 | 68 | 62 |
| 40 | AA | 141 | 98 | 106 | 75 | 71 | 50 | 35 | 25 |
| | A | 167 | 118 | 125 | 88 | 84 | 59 | 42 | 29 |
| | B | 244 | 156 | 183 | 118 | 122 | 78 | 61 | 39 |
| | C | 278 | 200 | 206 | 150 | 139 | 100 | 70 | 50 |
| | D | | 303 | | 228 | 165 | 152 | 82 | 76 |
| 50 | AA | 146 | 103 | 110 | 77 | 73 | 52 | 37 | 26 |
| | A | 200 | 142 | 182 | 106 | 100 | 71 | 50 | 36 |
| | B | 226 | 184 | 214 | 138 | 143 | 92 | 72 | 46 |
| | C | 341 | 244 | 256 | 184 | 170 | 122 | 85 | 61 |
| | D | | 341 | | 256 | 211 | 170 | 106 | 85 |
| 60 | AA | 178 | 125 | 134 | 94 | 89 | 63 | 45 | 32 |
| | A | 222 | 156 | 166 | 117 | 111 | 78 | 55 | 39 |
| | B | 303 | 214 | 227 | 160 | 152 | 107 | 76 | 54 |
| | C | 390 | 278 | 294 | 208 | 198 | 140 | 98 | 70 |
| | D | | 334 | | 250 | 234 | 167 | 117 | 83 |

Note:
1. Wire Load: 50% No. 9 A.W.G. Copper and 50% No. 8 B.W.G. Iron.
2. Ice Load: Coating on conductors ½ inch thick.
3. Wind pressures on Poles: Not taken into consideration. If wind pressure on poles is taken account of the factors of safety will be reduced about 5% for 10 wire loads to 10% for 4-wire loads.
5. Modulus of Rupture: Chestnut 5,100 pounds per square inch. Eastern White Cedar 3,600 pounds per square inch.
6. In obtaining wind data use velocity of fastest mile

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# PREFERRED CLASSES AND NUMBER OF POLES PER MILE FOR DIFFERENT WIRE AND ICE LOADING SUBJECTED TO DIFFERENT WIND PRESSURES FOR TELEGRAPH AND TELEPHONE POLE LINE ALONG RAILROADS

## TABLE VI

Factor of Safety of 2 — ½" Inch Ice Coating on Wires

| No. of Wires | Class Pole | 8" Wind=72 Mi. Velocity | | 6" Wind=61.5 Mi. Velocity | | 4" Wind=49 Mi. Velocity | | 2" Wind=33.5 Mi. Velocity | |
|---|---|---|---|---|---|---|---|---|---|
| | | No. of Poles per Mile. | | No. of Poles per Mile | | No. of Poles per Mile. | | No. of Poles per Mile. | |
| | | Eastern White Cedar. | Chestnut | Eastern White Cedar. | Chestnut | Eastern White Cedar. | Chestnut | Eastern White Cedar | Chestnut |
| 6 | A | | | | | | | | |
| | B | | | | | | | | |
| | C | | | | | | | | |
| | D | 42 | 41 Min. | 41 Min. | 41 Min. | 41 Min. | 41 Min. | 41 Min. | 41 Min. |
| 10 | B | 48 | | | | | | | |
| | C | 59 | 43 | 44 | | | | | |
| | D | 69 | 63 | 53 | 47 | 41 Min. | 41 Min. | 41 Min. | 41 Min. |
| 20 | AA | 48 | | | | | | | |
| | A | 61 | 43 | 46 | | | | | |
| | B | 45 H | 68 | 67 | 43 | 45 | | | |
| | C | 55 H | | 41 H | 51 | 55 | | | |
| | D | 64 H | 56 H | 48 H | 44 H | 65 | 41 | 41 Min | 41 Min. |
| 30 | AA | 67 | 47 | 50 | | | | | |
| | A | 43 H | 61 | 64 | 45 | 43 | | | |
| | B | 63 H | 41 H | 47 H | 61 | 63 | 41 | | |
| | C | | 56 H | 58 H | 42 H | 77 | 56 | | |
| | D | | | 68 H | 62 H | 45 H | 41 H | 45 | 41 |
| 40 | AA | 47 H | 68 | 71 | 50 | 47 | | | |
| | A | 56 H | 79 | 42 H | 58 | 56 | | | |
| | B | | 52 H | 61 H | 78 | 41 H | 52 | 41 | |
| | C | | 66 H | 69 H | 50 H | 47 H | 67 | 47 | |
| | D | | | | | 54 H | 51 H | 55 | 51 |
| 50 | AA | 49 H | 69 | 74 | 52 | 49 | | | |
| | A | 68 H | 48 H | 51 H | 74 | 68 | 48 | | |
| | B | | 62 H | 72 H | 47 H | 48 H | 62 | 48 | |
| | C | | | | 61 H | 57 H | 41 H | 57 | 41 |
| | D | | | | | 71 H | 57 H | 71 | 57 |
| 60 | AA | 69 H | 42 H | 45 H | 63 | 61 | 42 | | |
| | A | | 52 H | 56 H | 76 | 74 | 52 | | |
| | B | | 72 H | | 54 H | 51 H | 72 | 51 | |
| | C | | | | | 68 H | 47 H | 65 | 47 |
| | D | | | | | | 56 H | | 56 |

## TABLE VII

Factor of Safety of 3 — ½" Inch Ice Coating on Wires

| No. of Wires | Class Pole | 8" Wind=72 Mi. Velocity | | 6" Wind=61.5 Mi. Velocity | | 4" Wind=49 Mi. Velocity | | 2" Wind=33.5 Mi Velocity | |
|---|---|---|---|---|---|---|---|---|---|
| | | No. of Poles per Mile | | No. of Poles per Mile | | No. of Poles per Mile | | No. of Poles per Mile | |
| | | Eastern White Cedar | Chestnut | Eastern White Cedar | Chestnut | Eastern White Cedar | Chestnut | Eastern White Cedar | Chestnut |
| 6 | A | | | | | | | | |
| | B | 49 | | | | | | | |
| | C | 58 | | | | | | | |
| | D | 62 | 52 | 47 | 43 | 41 Min. | 41 Min. | 41 Min. | 41 Min. |
| 10 | A | 49 | | | | | | | |
| | B | | 46 | 54 | | | | | |
| | C | 44 H | 64 | 66 | | | | | |
| | D | | 47 H | | 48 | 44 | | | |
| | | | | | 70 | 57 | 47 | 41 Min. | 41 Min. |
| 20 | AA | 71 | 50 | 53 | | | | | |
| | A | 46 H | 65 | 69 | 49 | 46 | | | |
| | B | 67 H | 43 H | 50 H | 65 | 67 | 43 | | |
| | C | | 59 H | 62 H | 45 H | 41 H | 59 | 41 | |
| | D | | | | 66 H | 48 H | 44 H | 48 | 44 |
| 30 | AA | 50 H | 70 | | 53 | 50 | | | |
| | A | 64 H | 45 H | 48 H | 68 | 64 | 45 | | |
| | B | | 60 H | 70 H | 45 H | 47 | 60 | 47 | |
| | C | | | | | 57 | 42 H | 57 | 42 |
| | D | | | | | 67 | 62 H | 68 | 62 |
| 40 | AA | 70 H | 50 H | 53 H | | 71 | | | |
| | A | | 59 H | 68 H | 44 H | 42 H | 50 | 42 | |
| | B | | | | 59 H | 61 H | 59 | 61 | |
| | C | | | | | 69 H | | 70 | 50 |
| | D | | | | | | 50 H | 41 H | 76 |
| 50 | AA | 78 H | 52 H | 56 H | | 73 | 52 | | |
| | A | | 71 H | | 54 H | 50 H | 71 | 50 | |
| | B | | | | | 72 H | 46 H | 72 | 46 |
| | C | | | | | | 61 H | 43 H | 61 |
| | D | | | | | | | | 45 H |
| 60 | AA | 44 A | 68 H | 67 H | 47 H | 45 H | 65 | 45 | |
| | A | | | | 58 H | 56 H | | 55 | |
| | B | | | | | | | | 54 |
| | C | | | | | | | 49 H | 70 |
| | D | | | | | | | 58 H | 42 H |

Abbreviations: H=H fixtures; A=A frame.

NOTE. Calculations are based on the following data and assumptions:

1. Wire Load: 50% No.9 A.W.G. Copper and 50% No.8 B.W.G. Iron.
2. Ice Load: Coating on conductors ½ inch thick.
3. Wind Pressures on Poles: Not taken into consideration. If Wind pressure on poles is taken account of, the factors of safety will be reduced about 5% for 10-wire loads to 10% for 4-wire loads.
4. Pole strength: Figured from minimum specifications requirements of present W.U. specifications. See table I
5. Modulus of Rupture: Chestnut, 5100 pounds per square inch. Eastern White Cedar, 3,600 pounds per square inch.
6. In obtaining wind data use velocity of fastest mile.
7. A minimum of 41 Class D poles is prefered regardless of fact that, in some cases, the factor of safety will exceed 2. This minimum is necessary to get spacing of poles to carry present standard No.9 A.W.G. Copper Wire If factor of safety is required for wire, the poles may have to be spaced closer.

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the moment of the forces as described in the following, and the moments added.

The "moment" of the force is the product of the force in pounds, applied at the center of force, multiplied by the distance from the center of force to the ground in feet. A pole of sufficient strength to withstand this moment can then be picked out from Table No. 1. Suppose the force of the wind is 2,050 pounds per pole at the center of force, and this point is 16 feet above ground, then the load or moment of the force is 34,800 foot pounds. Table No. 1 shows a 20 foot chestnut class AA pole to have a strength of 69,600 pounds. If it were used, the factor of safety would be

$$\frac{69600}{34800} = 2.$$

The above assumes the number of poles per mile is known, but it is usually unknown, and is desired. Base Tables have been worked out giving the factors of safety for 100 poles per mile of AA, A, B, C and D chestnut and eastern white cedar for wind pressures of 2, 4, 6 and 8 pounds per square foot, and for 6 to 60 wires with half inch ice coating. These are Tables 2 and 3. From these the number of poles per mile required for any other factor of safety can be found by proportion.

Assume that the design is for a fifty wire line in territory where half inch ice and 72 mile (8 pound) wind occurs. (See Table 2). At 0.76 pounds per foot per wire for 8 pound wind and ice-coated wires, the pressure is 40.10 pounds per wire per pole, with spacing 100 per mile. Fifty wires give 2,005 pounds per pole. This is assumed to be transferred to the pole at the center of force 15.5 feet above ground for a 25 foot pole. This provides slightly more than the minimum 10 foot clearance below the bottom arm. The total moment of the force at the ground is $15.5 \times 2{,}005 = 31{,}600$ foot pounds. Class A chestnut poles are shown by Table 2 to have 2.11 as the factor of safety for these conditions when spaced 100 per mile. An even factor of safety of 2 will require

$$\frac{2}{2.11} \times 100$$

poles per mile, which is 95. This would not be a practical pole line, unless set as H fixtures. Therefore, it is necessary to consider AA poles. These have a factor of safety of 2.91 at 100 per mile and

$$\frac{2}{2.91} \times 100 = 69$$

poles per mile for factor of safety of 2, which is acceptable, giving a spacing of 76.5 feet.

It may be desirable to vary the spacing to suit the transposition requirements of a number of poles per mile, divisible by the figure eight. This variation of number of poles will cause the factor of safety to vary slightly, which may be less objectionable than improper spacing for transpositions.

The exact number of poles per mile for various loads of wires and wind have been worked out for even factors of safety of 2 and 3 for chestnut and eastern white cedar as shown in Tables 6 and 7. From these tables the undesirable numbers of poles have been eliminated and the minimum desirable number indicated for the lighter loads with the results as given in Tables 6 and 7.

Eastern white cedar and northern white cedar have, approximately, the same strength. Chestnut, cypress, southern pine and western red cedar have, approxiamtely, the same strength.

Where taller poles are required, as in grading a line and carrying it to extra height to clear buildings or road crossings, it is customary to use the same class of pole as in the body of the line. A glance at Table 1, strength of poles, shows that poles of the same class have slightly increasing strength with increase of length, but not enough increase to justify using a class smaller for the taller poles.

This method permits very rapid calculations, as the laborious part of the work has been done once for all.

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**Electrical Instrument Making for Amateurs.**

The above is the title of a book by S. R. Bottone, now in its eighth edition, which was written for the amateur experimenter who desires to learn electrical engineering principles by making electrical devices with his own hands. There are 272 pages and ninety-six illustrations, and detailed descriptions are given of how to make condensers, Leyden jars, induction coils, electroscopes, Tesla coils, magneto armatures, thermopiles, elementary wireless telegraph apparatus and many other pieces of electrical apparatus. The instructions are so simple that only inexpensive tools are required in making the instruments described.

The book sells for $1.35, and copies may be purchased from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

**"Mathematics for Engineers."**

"Mathematics for Engineers" is the title of a work by W. N. Rose, which embraces all of the mathematics needed by engineers in practice and by students in all branches of engineering science. The work is in two volumes; the first carrying the studies through algebra, plane trigonometry, mensuration and graphs, the work being carefully graded from an elementary to an advanced stage. The second volume is devoted to the calculus and its applications, harmonics and vector analysis, spherical trigonometry, etc. Volume I contains 507 pages and is an excellent book for the telegraph and telephone engineer or student to possess, as the treatment of the subject of mathematics here worked out is from the engineer's standpoint.

The price of each volume is $6.00 and copies may be procured from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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## THE EDISON EFFECT
### And the Audion.

In the litigation conducted during the past few years to determine the relative status as an invention of the De Forest audion and the Fleming valve, reference was made to the work along similar lines by Elster and Geitel in the year 1882, to Wehnelt's incandescent cathode rectifying tube of 1903, and to the Edison "effect" described in a paper presented to the American Institute of Electrical Engineers, New York, in 1884. In this paper diagrams were presented showing an incandescent lamp globe with regulation filament and in addition one or more insulated terminals sealed in the globe with the filament, the outside terminals of the latter connected through a galvanometer to the source of current heating the filament. When the current was increased and the filament made highly incandescent the galvanometer indicated a considerable flow of current, notwithstanding that one of its terminals was connected only to to an insulated wire or plate within the lamp bulb.

At the time of its discovery, and for many years thereafter, the effect observed was regarded merely as interesting phenomena. When, however, Fleming, in England, and De Forest, in the United States, in 1905-1906, developed their evacuated bulb detectors for electromagnetic waves, the early experiments of Edison were soon recalled.

It is a remarkable fact that in all of the search for priority the earliest work uncovered by the investigators was that of Elster and Geitel in 1882.

De Forest's patent No. 867,877; original application filed February 2, 1905, claims substantially as follows: "This device is intended to take the place of the coherer in wireless telegraphy. In consists of a receptacle with electrodes containing a gas. This is rendered partly conductive by electric heating, which brings the gas into ionic activity and makes its conductivity sensitive to electrical oscillations."

THE WORK OF BUFF.

The *National Telegraph Review*, New York, of July, 1853, contains the following significant report:

"Professor Buff, of the University of Giessen, has recently published an interesting paper on the electrical properties of flame. He has come to the conclusion that gaseous bodies, which have been rendered conductive by strong heating, are capable of exciting other conductors, solid as well as gaseous, electrically.

"Two small strips of platinum were introduced into a glass tube closed at one end; they were separted by an interval of a thin line of air. The air within the tube could not be heated to a degree sufficient to permit the electricity from two Daniell's cells to pass through it. When the glass became soft by heating, and both pieces of platinum were permitted to touch it, a strong deflection of the needle of a galvanometer was the consequence.

"When the strips of platinum were exposed to direct action of the flame of a spirit-lamp, the first notice of the passage of electricity was obtained when they were placed at about three inches above its extreme point, and began to show signs of redness. The deflection increased as the strips were lowered in the flame. When the flame was strongest there was a permanent deflection of 70 degrees. The flame current passed always from the hottest platinum strip through the separating interval of gas to the other strip. When the metallic wires or other conductors connected at one end were brought into contact with highly heated gas, it formed an electric circuit. One platinum wire was introduced into the obscure center of the flame of a lamp, and the other wire was brought near the outer surface of the flame; a current of electricity immediately exhibited itself, which passed through the flame from the inner to the exterior wire. By properly connecting a platinum wire, which was dipped into the center of the flame, with a condensing plate, the latter became charged with negative electricity, and hence Prof. Buff concluded that positive electricity is given off by the outer surface of the flame."

Had Buff been able to heat the interior of his glass tube by means of an incandescent filament he would have made the same demonstration Edison made, but it was not until nearly thirty years after Buff made his experiment that the incandescent lamp was perfected by Edison.

## Wireless Service Between Paraguay and Argentina.

An agreement has been signed by the Argentine and Paraguayan Governments for the establishment of a wireless telegraph service between the two countries. The installations have already been made, but the initiation of the service has been delayed by the failure of the Argentine government to ratify the convention. While the Paraguayan government approved the convention on November 22 of last year, it was not signed by the proper Argentine authorities until May of this year.

The same rates are to be in force as prevail in the regular telegraph service. The conclusion of this arrangement is of great importance to Paraguay, as the service between Asuncion and Buenos Aires is frequently suspended because of fallen wires. The service has been suspended at least four times during the past month, on one occasion for several days.

## Signal Corps Men Wanted.

Under date of September 2, Col. J. T. Conrad, chief, Publicity Bureau, United States army recruiting service, gave out the statement that recruting of applicants for the American Expeditionary Forces, Signal Corps, in Europe has been resumed. Enlistments are for one or three years, enlistments for one year being restricted to men with previous service. Radio operators, telephone lineman, telephone operators and repairmen are especially needed. Men are also needed for service in Siberia and on the Mexican border.

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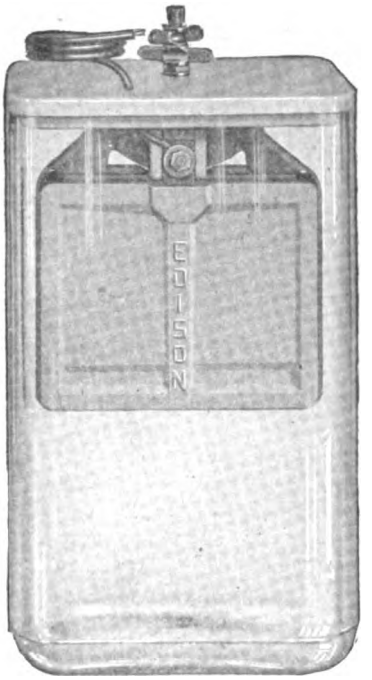
# FOR CLEAR TRANSMISSION

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THOS. A. EDISON, INC.

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## *GILL SELECTOR*

**THE UNIVERSAL SELECTOR FOR TELEGRAPH AND TELEPHONE**


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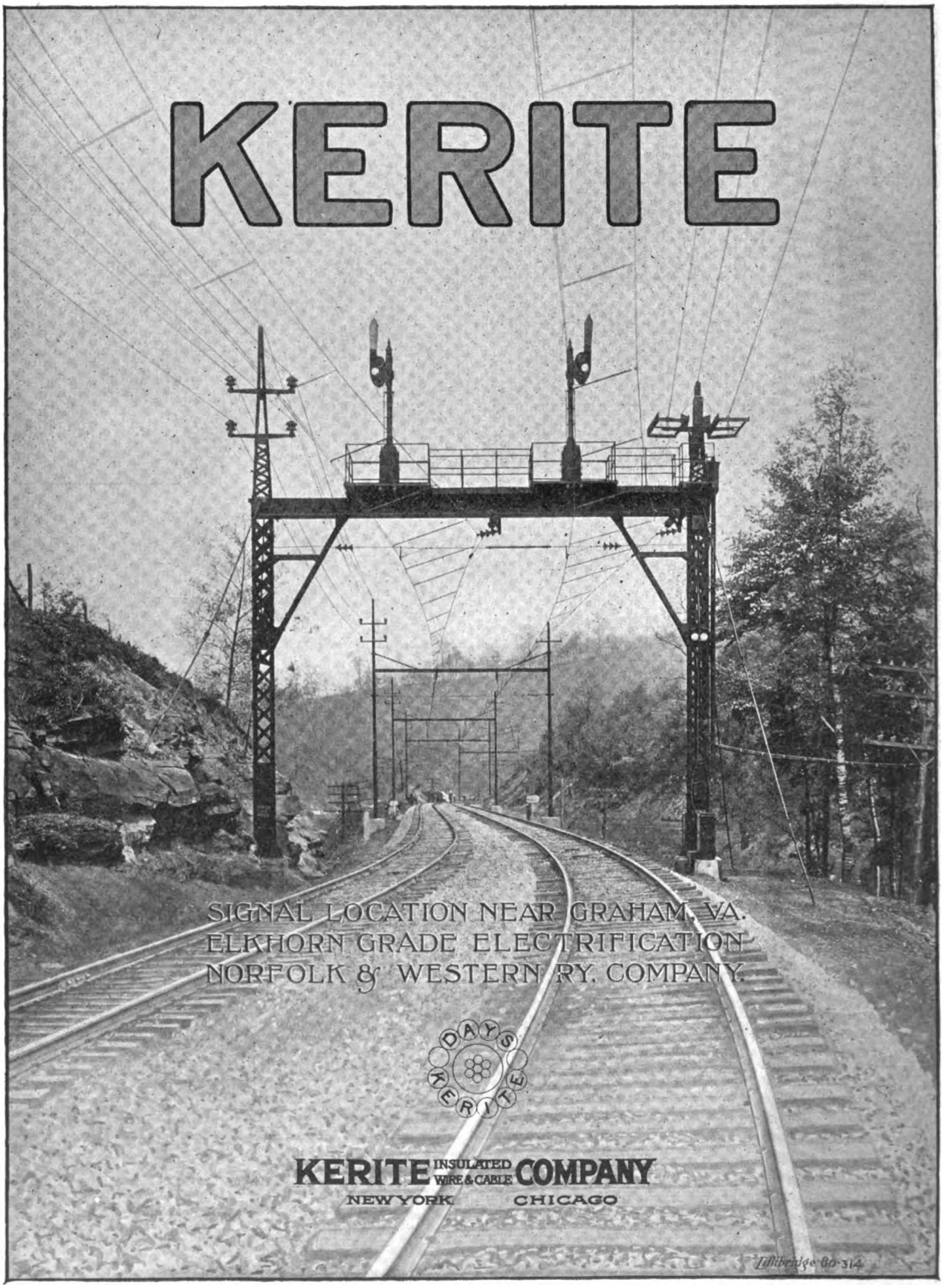



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# THE RAILROAD
## TELEGRAPH AND TELEPHONE

COMMITTEE NO. 4, Protection Against Lightning or Electric Light and Power Circuits, Telegraph and Telephone Division, American Railroad Association, of which J. F. Caskey, superintendent of Telegraph, Lehigh Valley Railroad is chairman, held a three days' session in New York, September 3, 4 and 5. The committee has very materially advanced the specifications on which it is employed. It is believed that the entire work of building specifications for the protection of telegraph and telephone plants will be completed for final consideration early in 1920, and be ready for adoption at the September, 1920, meeting of the Telegraph and Telephone Division.

Arrangements have already been made for future meetings of the committee.

### New York, New Haven and Hartford Railroad.

Superintendent of Telegraph H. A. Shepard, of the New York, New Haven and Hartford Railroad, New Haven, Conn., reports the following staff appointments:

Leroy A. Chidsey, chief clerk to superintendent of telegraph, effective August 12, 1919.

S. C. Fleetwood, Jr., telegraph and telephone censor, effective August 1, 1919.

W. C MacLaughlin, general foreman, telegraph department, effective September 1, 1919.

E. B. Smith, engineer, telegraph department, effective September 1, 1919.

J. C. Burian, foreman, telegraph department, effective September 1, vice Mr. MacLaughlin, promoted.

H. K. Reed, wire chief, Providence, R. I., vice C. J. Greenough, effective September 1, 1919.

### Baltimore and Ohio Railroad.

TELEGRAPH DEPARTMENT.

C. A. PLUMLY is superintendent of telegraph; E. W. Day, and E. T. Ambach, assistant superintendents of telegraph, and R. F. Miller, chief clerk to superintendent of telegraph.

ON SEPTEMBER 1, A. G. Hovermill was appointed general foreman, telegraph department, vice A. Stevens, appointed inspector and assigned to special duties.

A CONFERENCE of the general chairmen of the Order of Railroad Telegraphers was held in St. Louis, Mo., September 2 to 6.

### Missouri, Kansas and Texas Railroad System.

The construction of one No. 8 iron telegraph circuit, Waco, Texas, to Stamford, Texas, distance 227.3 miles, was completed on August 22.

The construction of a No. 9 gage copper telephone circuit equipped with Western Electric 101-B selectors between Wichita Falls, Texas, and Frederick, Oklahoma, distance 50.7 miles, for dispatching purposes, was completed September 2.

The company is now engaged in the construction of a No. 9 copper telephone circuit to be equipped with Western Electric 101-B selectors between Denison, Texas, and Wichita Falls, Texas, distance 129.3 miles, to be used for dispatching purposes.

The construction of these three circuits was made necessary on account of heavy increases in business brought about by development in the oil fields.

The phantom transposition of two copper circuits between Parsons, Kansas, and Denison, Texas, distance 274.3 miles, has recently been completed and work of installing phantom equipment is now under headway and will be completed this month.

In addition to the construction work mentioned above, the company is now engaged in the reconstruction of the telegraph line between Wichita Falls, Texas, and the Texas-Oklahoma state line, a distance of approximately 18 miles. Work on this section of the line progresses very slowly on account of the congested condition of railroad facilities and shortage of competent linemen.

It is proposed to reconstruct the telegraph line between Nevada, Missouri, and the Missouri-Kansas state line, distance approximately 16 miles, work to commence this month.


**"REMCO"**

**ALTERNATING CURRENT SELECTORS**

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**Tested and Proved**

Manufactured only by the

**RAILWAY ELECTRIC MANUFACTURING CO.**

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B. L. HALE is assstant chief clerk in the office of E. L. King, superintendent of telegraph, Southern Pacific Railroad, San Francisco, Cal.

MISS ANNA MARTIN, private stenographer to Superintendent of Telegraph W. H. Hall, of the Missouri, Kansas and Texas Railroad System, Denison, Tex., is correspondent for TELEGRAPH AND TELEPHONE AGE covering the various railroad lines making up the M. K. & T. System.

## Canadian Telegraph Notes.

Construction on the Canadian Pacific Telegraph Lines has been practically in abeyance for the past few years on account of war conditions, but this year the company has commenced again extending its system. On the prairie sections extensions to branches have been authorized to the amount of 208 miles of pole line carrying two wires. On existing lines, 6275 miles of 210 pounds copper wire has been authorized and most of the stringing has been completed. This includes wires from Halifax to Montreal, two from Montreal to Winnipeg, one from Toronto to Winnipeg, one Toronto to Port Arthur and Fort William, Toronto to Windsor, Ont., etc.

The company is also installing a telephone dispatching circuit between Port Arthur, Ont. and Winnipeg (including the Molson branch), covering a track mileage of 468 miles.

This fills in the last gap in telephone train dispatching on the line between Vancouver, B. C., and St. John, N. B.

The company has also authorized a considerable sum of money for reconstruction and renewals.

September 6th witnessed the unveiling at Montreal of a monument erected to the memory of Sir George Etienne Cartier, one of the founders of the Confederation known as the Dominion of Canada. An electric circuit was extended from Montreal to Balmoral Castle, Scotland (about 4600 miles), where King George V. closed the circuit promptly at 3:15 p. m., eastern time, thus actually unveiling the statue in Montreal. The connection was made over the Government Line in Great Britain, the Imperial Cable and the Canadian Pacific Railway telegraph system. The designing and installation of the equipment at Montreal was carried out by Inspector S. L. Elliott, of the Canadian Pacific Railway telegraph department.

Telegraph and Telephone Division of the American Railroad Association, M. H. Clapp, Chairman, Room 1004, Hurley-Wright Building, Washington D. C.

## H. C. Law.

Mr. H. C. Law, the subject of this sketch, is manager of the American Jobbers' Supply Company, New York. Mr. Law began his business career with A. W. Kenworthy, chartered accountant, of England and Wales. In this work Mr. Law acquired a thorough fundamental business experience as accountant in the auditing of various businesses.

After seven years' service with the above mentioned company, Mr. Law became associated with John H. Hammond, in complete charge of that financier's personal and business accounts, where he remained two years.

H. C. LAW.

Mr. Law then became sales representative of the Brookfield Glass Company, and travelled in all parts of the United States in the interests of that company. After a successful term of service with the Brookfield Company Mr. Law attracted the attention of Mr. M. L. Joslyn, president of the Joslyn Manufacturing and Supply Company, and president of the American Jobbers' Supply Company, and was, by that gentleman placed in charge as manager of the American Jobbers' Supply Company, New York. The stockholders of the company recently elected Mr. Law secretary, in addition to his duties as manager.

During the past ten years Mr. Law has been in attendance at the annual gatherings of the railroad telegraph superintendents, and is acquainted with practically all of the line construction officials of the railroads and commercial telegraph companies. Recently he opened in Boston, Mass., a branch office to handle the New England business of his company.

The American Jobbers' Supply Company's offices in New York are at 1122 Woolworth Building.

IN THE YEAR 1874, Elisha Gray invented the harmonic telegraph system, and in that year Edison and Prescott successfully worked a quadruplex telegraph system between New York and Boston.

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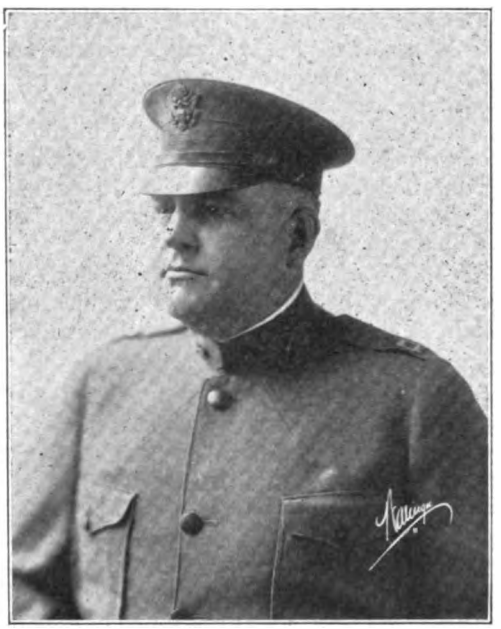
# INDUSTRIAL

## George Hull Porter.

George Hull Porter who, for many years, has been in charge of the Western Electric Company's railroad business in the middle western states, has been promoted to the position of railroad sales manager, in charge of all of the company's steam railroad business. Mr. Porter's connection with the Western Electric Company dates back to April, 1908, since which time he has handled the railroad sales of the company's Chicago office. Mr. Porter's new duties will take him to the various distributing houses located in all parts of the country.



GEORGE HULL PORTER.

The accompanying photographic reproduction shows him as he appeared during the late military activities.

THE WESTERN ELECTRIC COMPANY recently opened a new branch house at No. 334 East Bay Street, Jacksonville, Fla. The new branch consists of a sales office and warehouse. The house is in charge of A. H. Ashford. The new agency will carry a full line of pole line hardware, crossarms and other pole construction material.

F. H. VAN GORDER has been appointed manager of the Newark, N. J., store of the Western Electric Company. Mr. Van Gorder has been in the service of the company since 1907 as salesman connected with the company's Chicago house; manager of the Detroit, Mich. store and as power apparatus specialist in the New York office.

F. H. SWAYSE, of the Western Electric Company, has been appointed eastern district line material manager. Mr. Swayse has been with the company since 1904.

E. H. WADDINGTON, of the Western Electric Company, has been appointed western district manager, line material department, with headquarters at St. Louis, Mo. Mr. Waddington entered the company's service in 1910, and since that time has been identified with the Minneapolis, Minn., and St. Louis, Mo., houses of the company. He is president of the St. Louis Electricial Board of Trade.

THE MORKRUM COMPANY has issued a new pamphlet illustrating the company's shops, draughting rooms, and offices at 1410 Wrightwood Avenue, Chicago, Ill. The company now has over 1,500 telegraph printers in daily use in the service of the commercial telegraph companies, railroad companies, news associations, and industrial plants.

THE VIBROPLEX, semi-automatic telegraph sending machine, is at last gaining a foothold in European countries. Telegraph administrations and operators in Great Britain, France, Italy and other countries, are ordering these machines from New York in increasing quantities.

THE WESTERN ELECTRIC COMPANY has added a lighting department to its general sales organization. E. Cantelo White, for fifteen years a salesman and designer of electric lighting equipment, has been placed in charge of the new department.

## Radio Buzzer Sets.

TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York, can supply buzzer sets for learning the continental alphabet by means of buzzer signals, the same as heard in telephone receivers used in regular radio working. These sets are equipped with key, high-tone buzzer, and flash lamp signal, complete on one base. The price is $3.50 for the set.

TELEGRAPH SUPERINTENDENTS contribute to the well-being of their subordinates and to the efficiency of their telegraphs and telephones by recommending that all telegraph and telephone employees read TELEGRAPH AND TELEPHONE AGE. It costs this journal a large amount of money to publish the technical information and news items sent out twice each month at a cost to the reader of but two dollars per year.

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## International Association of Municipal Electricians.

CONVENTION AT CHICAGO.

The annual convention of the International Association of Municipal Electricians was held in Chicago, September 23-26. The attendance of members and visitors was large, and the technical and professional papers presented were all of unusual interest.

W. D. A. Ryan presented a paper on the subject, "History of Illumination;" W. G. Keith, commissioner of gas and electricity, Chicago, a paper on "Chicago's Novel Fire Alarm System," and Washington Devereaux, chief of the Philadelphia Fire Underwriters' Association, a paper on "Regulating Motion Picture Theatres." These papers were presented on the first day of the meeting.

Others papers presented during the convention were: "Protection for Fire Alarm and Police Signal Circuits," by J. Tyler Green, city electrician, Toledo, Ohio; "Planning and Layout of Flashlight Signal System," by G. F. C. Bauer, inspector police signal system, Buffalo, N. Y.; "Reminiscences of a Superintendent of Fire Alarm Telegraph," by Adam Bosch; "Municipal Electricians in Relation to Electric Power Engineering," by C. P. Steinmetz; "High Voltage Pole-Line Construction for City Streets," by M. G. Lloyd, Bureau of Standards, Washington, and "Industrial Motion Pictures," by F. A. Barron.

On the evening of the 23rd, a complimentary dinner and smoker was held in the Auditorium Hotel, and on the 25th, an automobile trip over Chicago boulevards, and in the evening a dinner, vaudeville entertainment and dance at the Congress Hotel.

## Telegraphers

IMPROVE THEIR EXPERTNESS.

By means of the Candler system of development, many telegraphers who, through long service, had lost their expertness with pen, "mill," or key are now able to hold the fastest wire positions. Also, operators who have despaired of ever being able to send rapid Morse, operate a typewriter with the minimum of effort, or write a good telegraph hand, are by means of this system of development enabled to realize their ambitions.

The Candler system is a proved success. Many telegraphers have been greatly benefited by taking it up.

See the company's advertisement elsewhere in this issue of TELEGRAPH AND TELEPHONE AGE.

THE MAIN OFFICES of the Western Union Telegraph Company were moved from No. 147 Broadway, to 195 Broadway, New York, on February 1, 1875. On the sixth floor of the building were placed 15,000 cells of primary battery. The number of telegrams handled daily in the operating room in that year was 35,000.

## THE TELEPHONE.

E. K. HALL, formerly vice-president of the New England Telephone and Telegraph Company on September 1, re-entered the service and was appointed vice-president of the American Telephone and Telegraph Company, associated with N. C. Kingsbury, first vice-president in charge of operation. Mr. Hall's duties will be mainly attention to relations with the personnel.

## Philadelphia-Chicago Telephone Cable.

The American Telephone and Telegraph Company's proposed aerial cable between Philadelphia and Chicago has been completed as far west as Harrisburg, Pa., the section between Reading and Harrisburg having been completed within the past few weeks. Between the latter two terminal offices the cable is made up of 14 quads of No. 16 gage, 124 quads of No. 19 gage, and one quad of No. 22 gage, or an equivalent of 305 pairs of No. 19 gage cable, and weighs 7.5 pounds per foot. The circuits in the entire cable from Philadelphia to Harrisburg, if it were possible to extend them singly in their equivalents of No. 19 gage, would pass once around the world, with an overlap from Philadelphia to Tokio, Japan.

B. C. Jutten of the American Telephone & Telegraph Company had charge of the engineering work and right of way provisions for this big cable job.

IT IS REPORTED from Chicago that a new organization to be known as the International Telephone Sales and Engineering Corporation, has acquired control of the Automatic Electric Company, of Chicago, manufacturers of automatic telephone systems. The stockholders of the latter company are to receive in payment for their stock 6 per cent. debenture bonds of the International company, the price of the stock being $125 per share. The capital stock of the International corporation is $3,800,000, and the authorized bond issue, $6,343,000. The debentures are payable serially from 1921 to 1925, inclusive.

## Submarine Cable Testing.

We have received a supply of "Darby and Fisher's Students' Guide to Submarine Cable Testing," fifth edition, one of the most popular books on this important subject.

The book contains 240 pages and deals with all tests and measurements made in modern submarine cable practice. An appendix is included which contains answers to all questions presented in the main work.

The price of the book is $4.50 and copies may be had from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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# FUNDAMENTALS AND FANCIES

## A LAYMAN'S EXCURSION INTO A NEW FIELD OF SCIENTIFIC SPECULATION

BY J. N. JOHNSON.

Mr. Willis H. Jones writes interestingly on "What is Electricity" in your April 16 issue. There are perhaps a few of us, however, who would consider some of his views as unfortunate, yet his unreserve and boldness in presenting them is to be commended.

To really know what electricity is, it is evident that we must know the cause of things. Now, do we know the cause of anything? Can we know it? We know only effects. We hear the click of the telegraph sounder, and say that the sound is from the impact of an armature moved magnetically by a current of electricity, supplied by a conductor from a dynamo driven by a belt from a wheel turned by steam generated from water by fire from coal, which is stored energy from a sun that receives or has received its energy from—what?

Here we meet the modern Atlas. On what does his foundation rest? And so always with the question in whatever form or manner we start with it.

Mr. Jones recognizes, as must we all perforce, a Master Force, which he then personifies as God Himself, which is well; but we dissent from the pantheistic materialism he voices a little further on.

This article cannot, nor would it, ignore the spiritual, as it is the primordial that we are led up to, and in this primordial we recognize and proclaim with Jeremiah, "The mighty God, the Lord of hosts is His name; great in counsel and mighty in work." Here we place our standard and making our seat at His feet, as it were, attempt to view in contemplation some movements in these mighty works—His Will and Word that has been given form.

We are told, by those eminently qualified for the statement, that true Science and the Bible have no quarrel. Too often a false science has sought in illy-veiled attempts to make God non-existent, notably in the untenable theory of evolution; or to detract from His personality. Herein lies a mistake of science and the constantly repeated error of human government and affairs in "reckoning without their host."

But further, an eminent scientist has said: "We do not say there is no God; what we say is that science cannot find him."

The science of matter has been a long time in groping its way to the electron as the elementary in matter. As such it may be viewed, but we cannot rest here. The electron is moving; moving with inconceivable rapidity and force. What gives it this movement?

"I firmly believe", says Mr. Jones, "that electricity is the one great Master Force, originating and emanating from God Himself, which through perfected laws governing its operations—only a few of which man has so far discovered—is responsible for the creation of all animate and inanimate matter."

We believe the one great Master Force in creation originates and emanates from God, the master of forces, but that electricity is not in itself that force. We view it as an effect, not the means, and believe it to be one manifestation, by transformation, of a primal force when that primal force, in its normal state, is in any way disturbed; *i. e.*, when its "perfected laws" are violated; when its equilibrium is disturbed. A pebble thrown into the water sets up mechanical waves on the water's surface; its equilibrium is disturbed; energy becomes visible, as it were. Metal moving through a magnetic field disturbs the equilibrium of that field and kinetic energy so called, that is, energy in motion, results. But what is this equilibrium? We are here dealing with effects, working upward. Let us start at the cause or source and work downward.

We are on fearful ground here and must tread it with reverence and trepidation.

God,—the cause, and the ether His means in creation. We dare not question as to God. He has declared Himself as *the* "I AM," and that is enough. The notion of the ether as an infinitely subtle and elastic all-pervading medium goes back to the earliest ages, but Anaxagoras, 500 B.C., introduced it as the cause of various phenomena. For its more ready conception by the student, a little tracing may help. The hardest known substance—diamond—is transparent, so is less hard glass, so is water; still less hard, practically incompressible but where mobility is met, next the more mobile, attenuated, invisible yet ponderable air lastly the infinitely mobile and subtle, invisible, imponderable, incompressible ether.

Conceive of God taking thought to form our world and this thought as setting up etheric motion which may be termed under a comprehensive head as wave motion, embracing every conceivable form, amplitude, frequency and direction, transverse, longitudinal, or oscillatory, vortical or what not. Here is chaos, but thought continues to play, bringing about order and law throughout the geologic ages to the six days thought instituting the era of man. In these six days thought or work, all that now terrestrially exists, was given final form by setting the nature and bounds of an etheric motion. Laws set, even to the laws of the fragile, wondrous snowflake with its constant of six spiculae, with its branches shooting from a central nucleus at an unerring angle of 60 degrees, orderly and limitless in design. Order is the law—here delicately traced, but with tremendous and inspiring impressiveness.

Consider the mystery of thought for a moment. Let it be represented by a rod of some length in our hand. We move the rod in the direction of its length; the remote end moves simultaneously and in unison with the end in hand—no time difference intervenes. In this manner God's thought may operate the incompressible ether. Distance and

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time here are meaningless. Thus God is omnipresent to all things. Here sight becomes amenable to the thought, so that His eye may view an object in its fullness irrespective of distance and with the instantaneousness of thought. No undulatory wave transmission or difficulties of perspective have part here. His omnipotence imparts and maintains the motions; His omniscience their form, correlation and destinies.

The eternal things which are to us the invisible spiritual, are perhaps based on a higher rate of motion, and so beyond the range of our senses. We pass through them or they pass through us as the hand may be passed through a powerful magnetic field, representing energy of many horse power, with no perceptible effect to the hand or to the energy. To the one to the other they do not exist.

What things we might see did our eyes respond; what sounds unheard by ears unattuned?

So all matter and the phenomena associated with its environment may be viewed as modes of motion derived from *an uncharted initial etheric motion which is the primal force.* If there be no novelty in submitting that all things visible and invisible are merely modes of motion without ultimate particle, electricity being but one in the innumerable and it be previously submitted, it seems to suffer undeserved neglect, so it would here be given an endorsement. The molecule, atom and electron as a workable theory may still remain; no violence may be done their conception, but remain as motion—motion within motion, motion passing through motion, interlocking, giving cohesion, all impacted or drawn toward a common center by a comprehensive wave motion evidenced as gravitation.

All here is motion perpetual, as He who gave it impetus is perpetual. Order and silence reign, but forces immeasurable lie locked in its embrace—*forces which operating undisturbed is Equilibrium.* It seeks to maintain itself as water seeks its level. Any disturbance of its established order or natural period gives birth to energy, which becomes partially available to our direction, but returns to equilibrium.

The movement called atoms of one substance may be brought into combination with those of another substance, forming chemically the movement molecular of a new substance, but their atomic identity; *i.e.*, their original internal motion is not lost. The individual movements form new movements in the process, and energy is manifested until equilibrium is established. It should be noted here that the terms motion and movements are employed reciprocally. No motion is lost; it may be amplified, transferred or transformed, in which is recognized the indestructibility of matter, and the conservation of energy.

We may segregate the electron as the ultimate of this movement, but it remains only as a manifestation of a primal movement—a swift witness of the Great Primal Force.

The Beta ray from the wonderfully active radium is shot out with such force as to penetrate a foot of solid iron, but the outlaw rejoins the great cosmos and resumes a lawful state. Thus we travel in a circle.

The idea of something imponderable as the ether becoming ponderable seems equivalent to something being made of nothing, and may trouble us; but if in thought we travel in straight line to the ultimate particle of matter, we must perforce look for something beyond that, so the process leads down to nothing. This straight line of conception becomes a circle of infinity. Even to be satisfied with a particle as ultimate there must be something to move that particle, so in the last analysis we come to motion, nothing more. The poet sings that thoughts are things. Perhaps they are in the supernal, but we have not the creative faculty, wherein is wise prohibition.

Drummond defines life as "The sum total of the functions that resist death." Adapting this phrase, we submit as concise and comprehensive in support of this theory, that *Energy is the sum total of the forces that resist disturbance.*

*Electricity thus becomes the disturbing of an etheric equilibrium.*

Now let us take a flight. We have seen the basic six and 60 degrees of the snowflake. By projecting their images on a screen Tyndall has shown ice in the process of liquefaction to be made up of similar forms. Crystallography shows several systems of formation in different substances. May not these have the suggestion of a lock, which some key formed in accordance with their order may open to us the primal force—some six-tined, sixty-degree fork on which we may impale the silent lightnings?

What of the orderly petalled, wonderful flower affecting sight, smell, touch, taste! May we not also hear it? May not its proper projection of color and shape on an approved selenium cell or screen properly manipulated interpret to us through the sensitive diaphragm of the telephone, its inherent music?

Why cannot the wireless with its many possible waves bring us to view, face to face, regardless of distance? An undisturbed space should give no image distortion. We would like to note more on the wave here, but it requires separate consideration. We think that soon our telegrams will come to us as modified photographs, but a step removed from the much sought vision at a distance.

Who knows but that we may combinate some new wave or motion that would be an outlaw in our cosmos—a challenger of gravitation's universal sway. Some substance having affinity for such a wave movement, as has iron for magnetic influences, and so to be expelled skyward, but under our control. Then would we safely sail the air at will, and hover at our pleasure. No more, waterways, no more railways, no more roadways, but highways, indeed. A new era instituted, second physically only to that of creation. Fantastic? Absurd? Perhaps. But,—

> Many a wondrous concrete thing
> Was born on fancy's mystic wing.

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# THE OLD TIME TELEGRAPHERS AND HISTORICAL ASSOCIATION AND THE SOCIETY OF THE UNITED STATES MILITARY TELEGRAPH CORPS ANNUAL CONVENTION

The thirty-sixth annual reunion of the Old Time Telegraphers and Historical Association and the fifty-eighth reunion of the Society of the United States Military Telegraph Corps took place at the Hotel Winton, Cleveland, Ohio, on September 10, 11 and 12. The weather was favorable throughout the meeting and the reunion passed into history as one of the most successful of the long series so far held.

The local committees were indefatigable in their efforts to please and that they succeeded is attested by the fact that everyone of the visitors returned home feeling that he had been well repaid for the time spent in the Forest City. Those who were most active in assisting President W. H. Canniff to make the reunion one long to be remembered were: W. R. Woodford, chairman of the general and entertainment committees; T. W. Hill, chairman of the finance committee; B. J. Ross, chairman of hotel, press and printing; Isaac Morris, chairman on registration; S. C. D. Johns, and D. C. Moon, members of the executive committee, and Dr. A. D. Campbell and many others. The ladies who were most active included, Mrs. W. H. Canniff, Mrs. D C. Moon, Mrs. A. D. Campbell, Mrs. T. W. Hill, Miss Selina Morris, Mrs. B. J. Ross, Mrs. F. E. Rudenauer and others.

### FIRST SESSION.

At 10 A. M., September 10, the business meeting of the Old Time Telegraphers and Historical Association was called to order by President W. H. Canniff, who, after delivering an interesting report of the association's affairs, introduced Mr. Bernstein, who represented the Mayor. Mr. Bernstein welcomed the visitors to the City of Cleveland in an eloquent and patriotic address which was responded to in a like manner by Mr. David Homer Bates of New York. The reports of the various officers were then read and ordered printed. The secretary's report showed that the membership had increased during the previous year and that the association now had a membership of about one thousand. Ninety deaths occurred during the twelve months, the names of seven forty-niners of the telegraph being among the number. They were James Merrihew, H. A. Reed, Andrew Carnegie, Dr. J. J. Clark, J. N. Worl, N. W. Bethune and Nathaniel Hucker.

The treasurer's report showed a balance of $791.25 on hand July 1, 1919. Ninety new members were added to the membership rolls during the year.

### ELECTION OF OFFICERS.

The following officers were then elected for the ensuing year: President, Geo. D. Perry, of Toronto, Ont.; vice-presidents, E. R. Wood, Allan Pudish, and J. J. Seitz, of Toronto; secretary-treasurer, Thomas E. Fleming of New York, John B. Taltavall, the former secretary-treasurer, having resigned on account of pressure of other duties; historian, John B. Taltavall of New York.

Toronto was selected as the new meeting place for the 1920 Reunion, the time to be between September 1 and 11th.

Mr. George D. Perry, the newly elected president, is general manager of the Great North Western Telegraph Company of Canada. Mr. E. R. Wood is president of the Central Loan Savings Company and Dominion Securities Corporation and one of the most eminent financial men in Canada; Mr. J. J. Seitz is president and general manager of the United Typewriter Company, and Mr. Pudish is general superintendent of the Canadian Pacific Railway Company.

On motion of Mr. E. P. Griffith of New York a committee consisting of David Homer Bates, Charles P. Bruch, Charles Selden, L. B. Foley and E. P. Griffith was appointed to confer with Thomas A. Edison, the object being to have that gentleman endeavor to obtain talking machine records of the hand sending in Morse characters of prominent telegraph people.

These records in Morse characters are to be made on key and sounder for the benefit of future generations of Morse telegraphers.

Mr. David Homer Bates then called on W. R. Plum of Lombard, Illinois, to preside over the meeting in behalf of the society of the United States Military Telegraph Corps.

After a brief address Mr. Plum called for the reading of the various reports, all of which showed the society to be in a very satisfactory condition.

Mr. David Homer Bates then read resolutions on the death of Andrew Carnegie, founder of the United States Military Telegraph Corps, which were adopted by the Society, as well as the Old Time Telegraphers and Historical Association.

Resolutions on the death of Colonel Wm. Bender Wilson, president of the Society for the previous twenty-two years, were also read and adopted.

Charles Patterson Bruch of New York was elected president of the Society to succeed the late Colonel Wilson, while the other officers were re-elected for the ensuing year. There being no further business the two organizations adjourned.

### THE ENTERTAINMENT.

The program of entertainment was an elaborate one. After adjournment of the two associations at

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12 noon, on September 10, the visitors assembled in the Rainbow Room of the hotel where luncheon was served, during which an entertainment was provided on the stage, consisting of fancy ice-skating. In the afternoon visits were made to many of the large department stores, for which Cleveland is famous, where the proprietors met the visitors and escorted them throughout the establishments. In the evening the entire delegation visited B. F. Keith's Theatre, where an excellent show was enjoyed.

On Thursday, September 11, at 10 a. m., the entire party went in automobiles sightseeing throughout the eastern section of the city, visiting Wade, Rockefeller and Gordon parks and residential districts, and the Museum of Art in Wade Park. Luncheon was served at the Country Club. In the afternoon a visit was made to Nela Park, the National Lamp Works of the General Electric Company, where an interesting entertainment was furnished. The process of the manufacture of incandescent lamps was illustrated in detail by moving pictures. In the evening a theatre party at the Stillman completed the entertainment for the day.

On Friday, September 12, at 10 a. m., an automobile ride over the new high level bridge through Edgewater Park and Edgewater drive, beautiful Lake Avenue and Clifton Park to the Cleveland Yacht Club, Rocky River, was thoroughly enjoyed. Refreshments were served at 2:30 p. m. at the Cleveland Yacht Club. The return to the hotel was via various interesting sightseeing routes. At 7 p. m. the Old Time and Military Telegraphers assembled in the French Room where an elaborate dinner was served. This concluded the entertainment program. Charles E. Adams, president of the Hardware Company, Cleveland, was introduced as the toastmaster by Mr. W. H. Canniff. Mr. Adams in presenting the speakers provoked much amusement by his humerous references to them. The speakers were W. H. Canniff, Cleveland, president of the Old Time Telegraphers and Historical Association; Charles P. Bruch of New York, who spoke on "The Ohio Boys in the Telegraph"; Charles W. Whitehair of Cleveland, "The Simplicity of Military Greatness"; William R. Plum of Lombard, Ill., "The Military Telegrapher"; Benjamin Karr of Cleveland, "Wires—Live and Dead," and Isaac Morris of Cleveland, who read a paper on Jeptha H. Wade. Mrs. Earl J. Rich sang, accompanied by Mrs. A. B. McConkey, several times during the evening.

At the conclusion of the exercises J. A. Chapman of Philadelphia, on behalf of the Old Timers and Military Telegraphers, thanked the various committees and those who had interested themselves in making the Cleveland reunion a success.

THOSE PRESENT WERE:

Ashtabula, Ohio.—C. W. Jaques.

Aspinwall Pa.—Mr. and Mrs. W. R. Smith.

Baltimore, Md.—F. G. Adams, Mr. and Mrs. Alfred Stevens.

Buffalo, N. Y.—Mr. and Mrs. J. E. Jenkins.

Black Lick, N. Y.—Miss Ellen N. Duncan.

Cleveland, Ohio.—Wm. Bligh, A. H. Cassidy, Thos. J. Brady, W. H. Strang, Daniel D. McKay, Mr. and Mrs. T. W. Hill, Mr. and Mrs. Allen G. Paine, W. J. Henry, T. C. Jennings, J. H. Rays, Mr. and Mrs. D. C. Moon, Miss Selina M. Morris, Mrs. Isabella Jackson, Isaac Morris, Mr. and Mrs. J. T. Hanford, Mr. and Mrs. W. H. Canniff, Mr. and Mrs. Wm. A. Manning, Mr. and Mrs. F. J. Dayman, Mr. and Mrs. G. E. Sharp, Frank B. Rae, Mr. and Mrs. A. D. Campbell, Mr. and Mrs. W. R. Woodford, Mr. and Mrs. B. J. Ross, Mr. and Mrs. F. J. Duey, T. W. Cockrell, George Oliver Smith, W. P. Miller, Mr. and Mrs. F. E. Rudenauer, C. S. Rindfleisch, H. W. Lewton.

Chicago, Ill.—Fred E. Crawford, Thos. J. Benson, Bertha R. Benson.

Columbus, Ohio.—Daniel H. Hart.

Cincinnati, Ohio.—Mr. and Mrs. I. N. Miller.

Chardon, Ohio.—Chas. S. Maynauer.

Cresson, Pa.—Mr. and Mrs. Henry Taylor.

Cartridge, N. Y.— —— Jenks.

Detroit, Mich.—Mrs. D. McCarty, H. J. Kinnucan, Mr. and Mrs. John L. Lucock, Mary F. Corbett.

East Cleveland, Ohio.—J. W. Simpson.

Freeport, Pa.—Miss E. M. Morgan.

Elmira, N. Y.—James Monahan.

Germantown, Pa.—John A. Chapman, J. K. Ray.

Indianapolis, Ind.—C. S. Rhoads.

Jefferson City, Mo.—W. E. Morlock.

Johnstown, Pa.—Mr. and Mrs. Peter Weitz, Miss Elinore Weitz.

Jersey Shore, Pa.—H. W. Wedge.

Lombard, Ill.—Wm. R. Plum.

Montgomery, Ala.—Edgar Winter.

Manistee, Mich.—F. V. Davis.

New York, N. Y.—Mr. and Mrs. John B. Taltavall, Mr. and Mrs. James P. Cullen, Thomas E. Fleming, Mr. and Mrs. D. H. Bates, Charles Patterson Bruch.

Newark, Ohio.—C. A. Anderson.

Pittsburg, Pa.—S. J. Armstrong, Mr. and Mrs. J. W. Yealy, Mr. and Mrs. Thomas Gosden, E. C. Bishop, Mr. and Mrs. D. Kelly, Mr. and Mrs. H. Rugg, Beatrice and Leah Rugg, Mr. and Mrs. John B. Stewart, Miss L. J. Duncan, Miss S. R. Haney, Miss Jane L. Collins, Miss Carrie E. Good, T. M. Magee.

Philadelphia, Pa.—Mr. and Mrs. J. A. Chapman.

Passaic, N. J.—E. P. Griffith.

Rawlings, Wyo.—Geo. M. Eitemiller.

Shreveport, La.—J. C. Robb.

St. Louis, Mo.—C. Dougherty.

Springdale, Pa.—Mrs. L. C. Adams.

Tarrytown, N. Y.—Mr. and Mrs. F. J. Scherrer.

Troy, Ohio.—C. W. Douglas.

Toronto, Ont.—Mr. and Mrs. G. D. Perry.

Trenton, N. J.—Mr. and Mrs. Wm. R. Morris.

Wilkinsburg, Pa.—Mr. and Mrs. W. I. McQuown

Watertown, N. Y.—W. D. Hanchette, Mr. and Mrs. S. W. Geary.

Warren, Ohio.—Mr. and Mrs. F. G. Jones.

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# QUESTIONS AND ANSWERS

### Automobile Battery.

C. S. R.—The card which contains a composition and is connected to the terminals of the battery consists simply of a high resistance unit. It does not increase the voltage of the battery, but by virtue of the added resistance in the circuit the initial voltage of the battery is given longer life; also the battery is prevented from being short-circuited, thus prolonging its life.

### Freezing Water Electrically.

M. E. C.—When a current of electricity flows through a continuous metal conductor heat is produced in the conductor. If the current is strong enough the conductor will become red hot; this is the principle of the incandescent electric lamp. It may be that the experiment you have been told about has reference to the antimony-bismuth couple. If a plate of bismuth and a plate of antimony are placed close together and the terminals of a battery connected to either plate, a drop of water placed between the plates will freeze due to the lowering of the temperature at the junction. In performing this experiment it is necessary that the water be cooled to the temperature of ice-water before being dropped between the plates.

### Newcomb Carlton.

C. L. H.—Newcomb Carlton has been president of the Western Union Telegraph Company since April 15, 1914.

### 100-Foot Aerial.

H. V. R.—If the 100-foot aerial is composed of four 7-22 wires, 2½ feet apart, at a height of ninety feet, it will have a wave length of 350 meters. The capacity of the aerial is approximately .0004 microfarad.

### Way-Office on Duplex Wire.

T. M. T.—If the duplexed wire is operated normally in one direction only, an intermediate office may be cut in on the circuit at any point between the terminal stations. At the intermediate office an ordinary 150 ohm relay, a key and a sounder are required. When it is desired that the intermediate office shall copy what is being sent, one terminal station keeps the sending key open while the other terminal is sending. The idea is to have positive potential to line at one end of the circuit, while negative potential is placed to line at the opposite end by closing the key. The intermediate office by operating his key can signal the terminal stations.

### High Frequency and Resistance.

G. R. F.—With high frequency currents, thick wire should not be used. It is better to use No. 36 or 40 wire bunched and twisted. However, a copper wire one one-hundredth inch or less in diameter has a high frequency resistance about the same as with direct current.

### Iron Telegraph Wire.

C. A. L.—Galvanized wire is made in three grades—B.B. (best, best), E. B. B. (extra, best, best), and steel. The different grades are distinguished by the percentages of carbon, sulphur, phosphorus, silicon and manganese used in their composition by different processes of manufacture. B. B. wire contains these impurities in smaller percentages than does steel wire, and although its tensile strength is not as great as steel wire, it is tougher, has lower resistance per unit length, and is less subject to surface corrosion. E. B. B. wire is manufactured by what is known as the puddling process, which, by eliminating the impurities, produces a nearly pure iron having low electrical resistance per unit length. Steel wire, although it contains high percentages of the impurities named, gains in tensible strength what it loses in conductivity. B. B. wire No. 8 gage, weighing 390 pounds per mile, has an electrical resistance of 14.36 ohms per mile. E. B. B. wire of the same gage and weight per mile has a resistance of 12.05 ohms per mile, and steel wire of the same weight and gage has a resistance of 16.71 ohms per mile.

### Bolinas and Marshalls Stations.

S. E. R.—The radio station at Marshalls, Cal., is situated about 36 miles northwest of San Francisco. The station has steam railroad connection. The station at Bolinas, Cal., is situated about 18 miles northwest of San Francisco, and is reached by the water route.

### Capacity and Inductance of Line Wires.

G. D. H.—Within certain limits of pole height, the capacity of line wires increases the nearer the wires are to the earth, while the inductance increases the further the wires are removed from the earth. A wire mounted on a pole line at height of 20 feet has a capacity per mile of approximately .1180 microfarad when both ends of the wire are grounded. The inductance of a single wire grounded at each end is approximately .003020 henry per mile, with the wire at a height of 20 feet above the earth. At a height of 30 feet it is approximately .003150 henry.

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# Electro-Physics for the Telegraph, Telephone and Radio Student

No. 14.

## Telephone Transmission.

The next few lessons will be devoted to a consideration of the engineering of telephone transmission, as we may now take up this subject at a point where what we have been studying in the previous lessons may be found to be directly applicable.

All of the terms, factors and quantities with which we have been dealing—frequency, time-constant, harmonics, wave length, etc.—are intimately related to telephone engineering. In fact, telephone transmission is essentially an alternating current problem, as distinguished from direct currents employed in most telegraph systems.

Commercial alternating current work as it concerns power transmission, electric lighting and electric railroad operation has to do with low frequencies (25 to 60 cycles per second), with relatively large current strengths (one to 1,000 or more amperes), while telephone transmission involves the use of currents of but a few milliamperes at frequencies ranging from approximately 200 to 2,000 cycles per second.

At the sending end of a telephone circuit the voltage impressed on the line is from three to five volts, with a sending current of from three to five milliamperes, and the decay of current strength along a line is such that in practice it is regarded as satisfactory if ten per cent. of the transmitted current reaches the receiver at the distant end of the line.

The important factors which determine the distance of telephonic speech are capacity, ohmic resistance, inductance, and leakance; the latter term being the inverse of insulation resistance. Where overhead lines are used; that is exposed wires on poles, these factors are not constant, but vary considerably due to varying weather conditions along the line, induced currents from other electrical systems, etc.

As a result of the existence of these factors electrical impulses in a telephone circuit are subjected to attenuation and distortion, both of which adversely affect telephone transmission.

Attenuation is a diminution of the amplitude of the current wave, and is caused chiefly by losses due to resistance, capacity, and leakance. Distortion, by altering the relative phases of the subsidiary waves, suppresses the higher notes or harmonics and is evidenced in telephoning by alteration in the natural sound of the speaker's voice. The cause of distortion is, chiefly, inductance and capacity. The presence of inductance causes a lag instead of a lead in the resultant speech wave, while the electrostatic capacity absorbs and discharges a portion of the current waves, flattening them out, and causes a retarding effect upon the velocity of wave propagation.

For determining the degree of distortion and attenuation in a given instance the following formulas developed by Heaviside are applicable:

a = attenuation,
d = distortion,
R = resistance,
C = capacity,
L = inductance,
S = leakance per unit length of circuit, then

$$a = \frac{R}{2L} + \frac{S}{2C} \text{ and } d = \frac{R}{2L} - \frac{S}{2C}$$

Consideration of these formulas will disclose that an increase in the resistance of the circuit will increase the distortion and the attenuation, and that an increase in the inductance reduces both; also, that an increase in leakance increases the attenuation and reduces the distortion, while an increase in the capacity increases distortion and may reduce the attenuation.

*(To be continued.)*


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## SHOP TALK.

### Operating Long Morse Circuits.

BY THE OBSERVER.

We have often heard the expression, "Too many extremes and never the happy medium." In ruminating on the significance of this statement, and its applicability to the telegraph business, I am reminded of the custom of some testing and regulating attendants; and, of some of the fast Morse operators, in running to one extreme or the other.

We find sometimes that after an operator has been using a sending machine on a short line, at top speed, he is called upon to work a circuit stretching from coast to coast, in which there are several sets of repeaters. It often happens that over such a long stretch of territory there may be a heavy rain falling upon a considerable section of the line, resulting in that portion of the circuit being weatherbound.

When this condition prevails, and a repeater chief asks a sending operator to adjust his transmitter for long-circuit signals, too often the operator becomes indignant; casts aspersions upon the skill of the repeater chief, when, forthwith commences a war of words by wire.

It is highly commendable how, in the majority of cases, operators move the business, and a repeater chief should strive in every way possible to condition the circuit to its greatest speed. Most operators positively claim that they know how to adjust their transmitters for any kind of circuit, and they should be credited with the ability to exercise that knowledge until it is perfectly plain that they are not expert.

All other remedies should be applied before an operator is requested to slow up or to change the adjustment of his transmitter. When a neighboring repeater chief tells you the signals are passing uniformly, and the signals appear uneven to you, ask him what voltage he has to line. If his voltage is the same as yours, make sure the poles are even. If there is a difference in the voltage at each end the signals are almost certain to be uneven.

Too much care cannot be exercised to make sure that your relays are magnetically centered. If all due care is taken and you are still forced to ask an operator to reduce speed give him your reason for making the request.

To operators I would say, do not feel that a repeater chief is not "on to his job" when such conditions arise; but, rather, feel that your greatest ambition is to move as much business as possible in a given time. Surely, all will agree that a reasonable speed with few or no breaks will result in a greater volume of business being moved, than top speed with numerous breaks.

Recently I listened to just such a wire dialogue as herein referred to, on a circuit 2,400 miles long. The sender would not reduce the speed until requested by his own repeater chief to do so, and after being so requested he complied, and within a short time had cleared up the file. Previously he had been sending at the rate of 100 per hour, yet, owing to the breaks, both ends of the circuit were not moving 30 per hour. The Morse as sent by the operator after he made the change was music to the ear; the signal sounds fairly danced in unison; there was no further repeater attention called for, and I am sure that not only the sender, but the receiver as well, found pleasure in the work.

Too many are inclined to call a halt before they have made proper efforts to bring the circuit up to its existing capacity. That is poor management. It is well to remember that "haste makes waste." therefore do not act hastily; but, after every good move you can make has been made, make your ruling accordingly.

### The Old Wire Chief on the Industrial Situation.

"What the country needs at the present time is a cheer leader."

"The radical labor press, and the press representing the interests of capital and property should arrange for a system of exchange editors."

"They say there is a good deal of water in railroad stocks. There is, indeed; but most of it is the water from the arms and backs of the forty dollars per month men who built the roads and operated them until they could earn enough to pay their own way. If the shop keepers and village bankers who mortgaged their homes to raise the money to buy the first rails and spikes have got their money back long ago, and, as some think, are no longer entitled to dividends, what chance has the forty dollar per month pioneer to redeem the sweat he contributed? Or, if he is willing to cancel the account, is there any reason why the money should be paid to immigrants who have arrived in the country during the past ten years?"

"When I cast my first vote everyone under thirty voted the straight 'smash 'em up' ticket, and everyone over that age seemed to vote the conservative 'take it easy, go slow' ticket. The fellows who at that date were over thirty are now mostly in Heaven, but I notice we still have a majority in favor of the 'take it easy, go slow' aggregation. The answer is that as we get along in years, take on responsibility and acquire a little stake in the country we change our ideas as to what is the best thing to do."

"A well known radical a few weeks ago said: 'The country to-day is in a condition where if someone drops a match the whole thing will blow up.' He undoubtedly intended that statement to be that very match. Did you notice the big blow up?

"There are 22,000,000 people in this country who own Liberty bonds. There are over fifty million insurance policies in force in this country. There are nearly 27,000,000 people in the country who have bank accounts. There are 7,000,000 families living on farms, and 10,000,000 families in the cities and towns of the country own their own homes. How amused they all must be at times to read of the activities of a fistful of irresponsibles looking to the turning over of all property to a bewhiskered, comic opera Bolshevik dictator picked up in the slums."

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## OBITUARY.

### Death of William Giles.

William Giles, during the past twenty-nine years a member of the operating staff of the French Cable Company, 25 Broad Street, New York, and who during recent years has been night chief operator, died at his home in Brooklyn, August 9, last, at the age of fifty-one years.

Mr. Giles was born at Bridgend, Wales, England, and his first employment in the telegraph service was in the Bridgend office as messenger. At eighteen years of age he passed the required examination for the position of telegrapher, at Cardiff, and returned to his home town to fill a position in that capacity.

In 1899 Mr. Giles came to New York and joined the staff of the Commercial Cable Company, where he remained a short time, later entering the service of the French Cable Company at St. Pierre, Miquelon. At the St. Pierre station his demonstrated ability was such that within a few months he was transferred to the New York office where he remained until the time of his death.

Mr. Giles is survived by his wife who resides at No. 125 Sherman Street, Brooklyn, N. Y.

WILLIAM F. KRUEGER, Morse operator in the Chicago office of the Western Union Telegraph Company during the past thirty years, died September 9. Mr. Krueger possessed a pleasing personality which, brightened by a keen sense of humor, won for him many sincere friends.

ASSESSMENT No. 663 has been levied by the Telegraph and Telephone Life Insurance Association to meet the claims arising from the deaths of E. A. Barnard at Washington, D. C., R. H. Bowran at New Orleans, La., L. K. Whitcomb at Monrovia, Calif., Dr. F. H. Koehler at Buffalo, N. Y., and Charles J. O'Connor at Jamaica Plains, Mass.

### New Book on Radio Telegraphy.

"Principles of Radio Telegraphy," is the name of a new book by C. M. Jansky, which covers the latest practice in radio engineering. The book contains 237 pages and has 179 illustrations.

The first four chapters deal with elementary electrical engineering as applied to radio work, and the remaining seven chapters go thoroughly into the subjects of electromagnetic waves, alternating currents, oscillatory circuits, radio circuits, practical transmitting appliances and methods, practical receiving appliances and methods, and vacuum tubes and their use in wireless telegraphy.

We recommend this fine work to all who are studying or who intend taking up the study of radio signaling.

The price of the book is $2.00 and copies may be purchased from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

### S. B. Gifford Eighty-three Years of Age.

The Syracuse, New York, *Post-Standard*, of August 10, contains an interesting interview with the veteran telegrapher, S. B. Gifford, who is now eighty-three years of age, and who for fifty-two years was identified with the Western Union Telegraph Company at Syracuse, at first as messenger boy and finally as superintendent of the district, with Syracuse as headquarters. Since his retirement from the telegraph service, several years ago, Mr. Gifford has employed his time compiling genealogies of a number of prominent families.

### "The Sword and the Soul."

The above is the title of a new book by Col. W. R. Plum, the veteran telegrapher of civil war fame. The story deals with the adventures during the war of a Union telegrapher who had many hairbreadth escapes, and who performed many ingenious exploits in erecting and maintaining telegraph lines for the use of the Federal military forces.

The story is cleverly written; the plot is absorbing; the book is well illustrated and beautifully bound. $2.00 per copy from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

### Electrical Rules and Tables.

We have received a small supply of the twentieth edition of Munro and Jamieson's Pocket Book, containing electrical rules and tables. The book is pocket size and contains over 800 pages of up-to-date engineering data and circuit testing, electric conductors, telegraphy, telephony, radio, electrochemistry, Rontgen rays, batteries, dynamos and motors, transformers, electric lighting, magnetic measurements, etc. The price is $3.50 per copy, from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

### Cable Telegraphy Course.

NEW BRANCH IN ELECTRICAL ENGINEERING AT COLUMBIA.

A course of instruction in cable telegraphy as a branch of electrical engineering for the fall term is announced by the Department of Extension Teaching, Columbia University. The instructors will be Walter I. Slichter, professor of electrical engineering, and Alexander Cunningham, instructor in extension teaching.

Classes will meet Monday, Wednesday and Friday evenings, from 7.30 to 9.10 o'clock, in the Engineering Building. The course is designed to give training in the scientific or technical principles of cable telegraphy as well as in the manipulative skill and practice required to send and receive messages in the Morse code as used by the cable companies.

On successful completion of the course, the student will receive a certificate of qualification.

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# Telegraph and Telephone Age

TELEGRAPHY - TELEPHONY - RADIO

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## The "Bug" in Radio Work.

As might have been expected, the extension of the use of the semi-automatic sending machine, of which, in this country, the Vibroplex is the most widely used type, and variously known as a "wig-wag," "bug," etc., has brought to radio traffic officials similar problems to those which have for the past fifteen years been present in land line telegraph operation.

It has for some time been apparent that a considerable amount of the message repetition necessary in radio work is due to careless, or inexpert handling of semi-automatic transmitters. Properly adjusted and intelligently operated, the Vibroplex is a satisfactory transmitter for radio as well as for land line telegraphs, but experience shows that if the adjustment is left to the judgment of the operator, and unless operators are constantly supervised in the handling of the machine, satisfactory transmission is not likely to follow.

When a letter "s" or a letter "h" is made with a Vibroplex adjusted for high speed, the duration of contact for each dot is very short, and very brief intervals of time elapse between contacts made by succeeding dot vibrations of the lever. In radio work it is imperative that each dot be allowed time enough to permit of clearly defined functioning of the apparatus and circuits between the key and the antenna. Also, young operators have a tendency to buzz away and transmit superfluous signals; signals unnecessary to the business in hand, thereby placing upon the receiving operator the added burden of sorting out what is necessary and what is unnecessary in the incoming signals.

As a first step in correct Vibroplex adjustment for radio work, it is helpful to adjust the lever weights so that not more than fourteen letters "p" may be transmitted in ten seconds' time, each letter clearly formed. Also, the user of the machine should constantly aim to imitate closely good hand sending.

There are many operators, who send with a Vibroplex so that it is impossible for the listener to say whether the hand or the machine is being used.

It is a noteworthy fact that expert senders such as F. M. McClintic, W. M. Gibson, R. C. Bartley, T. E. Brickhouse, M. J. Wolinsky, Robert I. Flowers and the late George W. Conkling all used the hand key when establishing high-water marks for fast sending. It is plain that the hand sender cannot form the "all dot" letters, or the dot portions of the remaining letters, as rapidly as can the Vibroplex user. To account for the high speeds attained by good hand senders it is necessary only to recognize that they handle the "dashes" better, lose the minimum of time in spacing and hook up the letter elements more uniformly. However, there are Vibroplex senders who can do these very things, and their style of sending should be the fashion among other Vibroplex users, as the musical sending of the old-time expert hand senders was the fashion among their contemporaries.

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# CURRENT EVENTS

## EXECUTIVE OFFICE ANNOUNCEMENTS, PERSONAL MENTION, APPOINTMENTS

### WESTERN UNION TELEGRAPH COMPANY.

LEWIS MCKISICK, assistant to the president, and W. N. Fashbaugh, vice-president in charge of traffic, have returned from their vacations.

CHARLES E. DAVIES, superintendent of traffic, Great Northwestern Telegraph Company, Toronto, Ont., was in New York October 9 and 10, on business of his company.

MISS ANNIE ENGLISH, daughter of S. M. English, general manager, Western Union Telegraph Company, Dallas, Tex., was on October 14 married to Seymour S. Stafford of Palestine. Tex

H. R. MONOHAN, division equipment supervisor, Dallas, Tex., is in New York on company business.

W. R. WILLIAMS, until recently manager at Washington, D. C., has been appointed manager at Portland, Ore.

W. A. ROBB, manager at Portland, Ore., has been appointed commercial agent at Portland.

F. L. LETOURNEAU, manager of the office at Evanston, Ill., has been advanced to the managership at Springfield, Ill.

CARL CONGDON, manager of the office at Springfield, Ill. has been advanced to the managership at Milwaukee, Wis.

WALTER E. NEWCOMBE, chief operator at Ashland, Ore., on September 15, was transfered to Redlands, Calif., as chief operator.

F. A. PLEDGER, chief operator at Sweetwater, Tex., is absent on account of sickness.

FREDERICK W. MARTIN, who has been in overseas military service, as a member of the 35th Service Company, Signal Corps, for several months located in the Paris telegraph office, has returned home and entered the service of the Western Union Telegraph Company as automatic attendant at Jacksonville, Fla.

THE COMPANY has opened an office at Gallup, N. M.

A BUSINESS MEETING and banquet was held at Fargo, N. D., September 12, by visiting representatives of the company. Among those present were; A. D. Bradley, general manager, Central Division, A. C. Kaufman, general commercial agent, New York; J. C. Nelson, district commercial superintendent; W. J. Armstrong, district traffic supervisor; J. J. Brittnacher, district commercial manager; C. W. Askelof, division auditor; J. L. Ferciot, division commercial manager; Mrs. L. C. Rigdon, branch office manager, Omaha, and L. A. Swenson, manager, Fargo.

### Western Union, Fourth District, Lake Division.

E. W. GROB has been appointed district commercial agent, with headquarters at Cincinnati, Ohio.

M. F. ROBENALT, former manager at Portsmouth, has been appointed assistant manager at Akron, Ohio, vice P. L. Arsdale, transferred to the traffic department.

W. J. DUGAN has been appointed manager of the office at Portsmouth, Ohio, vice M. F. Robenalt, transferred.

C. H. LACEY former manager at Fostoria, Ohio, has been transferred to Sandusky as manager.

W. H. BLECHINGER has been appointed manager at Fostoria, Ohio. He was formerly located at Port Clinton.

WALTER JACK has been appointed manager at Port Clinton, Ohio. He has been acting as vacation relief manager.

C. E. GRESHNER has been appointed manager at Bellefontaine, Ohio, vice C. H. Galloway, furloughed.

F. A. GERLING, formerly of the traffic staff at Canton, Ohio, has been transferred to Ashtabula, Ohio, vice W. H. Morris, furloughed.

MRS. ESTELLE REEMER has been appointed manager of the office at Columbiana, Ohio, vice Vera Roman, resigned.

### Salt Lake City, Utah, Western Union.

U. G. LIFE is district commercial superintendent, second district, Mountain Division, with headquarters at Salt Lake City.

EFFECTIVE AUGUST 1, H. W. Deneke was appointed city superintendent at Salt Lake City. Mr

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Deneke entered the service at Lincoln, Neb., in September, 1901, as messenger boy, later serving as clerk and chief clerk at Omaha, Neb., in June, 1911, being transferred to Salt Lake City as chief clerk to the district commercial superintendent. In January, 1915, Mr. Deneke was appointed manager of the Billings, Mont., office, and in 1916 was transferred to Salt Lake City as district commercial manager, two years later being appointed manager of the Salt Lake office, where he remained until his recent promotion to the position of the city superintendent.

EFFECTIVE AUGUST 1, J. B. McLeod was appointed office manager at Salt Lake City, being promoted from the assistant managership of that office. "Mac," as Mr. McLeod is familiarly known, admits that he was at Byhalia, Miss., as far back as April, 1899. However, his long record of service indicates that he was manager at various points in Arkansas, Texas, and in the Gulf and Mountain Divisions.

J. H. MOORE was, on September 24, apppointed manager of the office at Pocatello, Idaho, being transferred from the managership at Livingston, Mont.

H. H. HARDY was, on August 16, appointed district commercial manager. During the past twelve years Mr. Hardy has held many important positions in the telegraph service.

A. K. MITCHELL was, on August 16, appointed chief clerk to the district commercial superintendent, vice Mr. Hardy, promoted. Mr. Mitchell entered the service in 1912 in the general manager's office at Denver, Colo. In 1914 he was transferred to the Los Angeles office, and from there to the Salt Lake district in 1918.

### Large File from President's Special.

On President Wilson's trip to the Pacific coast and return, during the month of September, records were broken for the amount of newspaper special matter filed for telegraphic transmission. The stop at Spokane, Wash., resulted in the filing of 50,000 words for transmission from that city alone. F. C. Cole, district commercial superintendent and W. F. Schwandt, division traffic supervisor, Seattle, Wash., were on hand to direct the handling of the Western Union Company's share of the file. C. G. Reath, manager for the Postal Telegraph-Cable Company at Spokane, looked after his company's interests. Operators F H. Ferris and P. F. Snyder, of the Associated Press, also handled a large file of matter for the newspapers served by the A. P.

IN THE YEAR 1870, Van Bezold discovered interference phenomena produced in electric conductors by advancing and reflected oscillations; the oscillations being produced by means of a Leyden jar.

## POSTAL TELEGRAPH-CABLE COMPANY.

### Postal Telegraph-Cable Company.

EDWARD REYNOLDS, vice-president and general manager, has returned from a short vacation trip through New England.

G. W. RIBBLE, general superintendent, Southern Division, Atlanta, Ga., was a recent visitor at the executive offices, New York.

HARVEY D. REYNOLDS, superintendent, Buffalo, N. Y., is spending his vacation this year in Cuba.

E. W. COLLINS, general superintendent, Western Division, Chicago, has just completed a trip of inspection to offices in the fourth district.

E. P. TULLY, assistant to the general manager, New York, recently visited the offices in Baltimore, Md., and Boston, Mass.

C. E. BAGLEY, superintendent, Philadelphia, Pa., recently visited the offices in Baltimore and Washington.

RUFUS GOULD, of the plant department, recently attended a conference at Hartford, Conn., of the joint pole line committee of the State of Connecticut.

Q. A. ANDREWS has been appointed chief operator of the main office at Albany, N. Y., vice H. S. Mason, resigned.

W. P. COLLINS has been appointed assistant chief operator of the main office, Buffalo, N. Y., vice J. A. Keller promoted to general traffic chief.

A. H. CLARKE, chief clerk to Superintendent C. F. Leonard, of the First and Seventh Districts, Eastern Division, New York, has returned from his vacation, which he spent with his family at a resort on Long Island.

R. R. FOLLEN has been appointed manager of this company's office at Warrensburg, Mo.; W. A. Porter, manager of the office at Catskill, N. Y., and L. Von Ark, manager at Malone, N. Y.

A. A. AKERS has been appointed manager of the office at Rock Springs, Wyo.

P. T. CROSBY has been appointed manager of the Grain Exchange office at Oklahoma City, Okla.

THE COMPANY is at work on new line construction which will increase its facilities between 150 and 200 per cent. through the states of Virginia, Georgia, North and South Carolina, Alabama, Mississippi and Tennessee. From Washington, D. C., to Greensboro, N. C., two new lines are being erected, and two new circuits between Raleigh, N. C., and Augusta, Ga.

H. W. BROOKS has been appointed manager of the company's office at East Liverpool, Ohio.

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### New York Postal Notes.

JOHN J. FREDERICKS, general traffic chief; William Mitchell, timekeeper; and Miss F. Schunk, of the manager's office, have returned from their vacations.

MISSES M. SULLIVAN AND CATHERINE CLIFFORD of the second Boston circuit have returned from their vacations; also Miss K. O'Brien, of the second Philadelphia; Mrs. Edna Hammond of the first Buffalo wire, and William H. Schlaefer of the first Montreal circuit. Mr. Schlaefer spent the time in Delaware County, New York, and as he is an expert with the camera, he brought back a large number of excellent photographs of country scenes.

JAMES U. WALLACE, chief clerk to Manager D. F. Mallen, has returned from his annual vacation.

ROSE HARRIS, operator at "Fq" office. 20 West 45th Street, has been transferred to the operating department, Cotton Exchange, New York.

## PERSONAL.

R. L. TURPIN, the well known telegraph expert, is now chief operator in the telegraph department of Paine Webber & Co., New York.

ROSCOE JOHNSON, widely known as an expert Morse telegrapher, and during the late war a captain in the military service, was recently elected president of the Commercial Telegraphers' Union of America. In accepting the presidency of the union, Mr. Johnson indicated in his remarks that his administration will be conservative and constructive.

EDGAR P. GOODWIN, for several years a member of the automatic printer staff in the New York main office of this company, is now electrical engineer in the service of the Thomas Bruce Boyd Engineering Company, New York.

### Submarine Cable Testing.

We have received a supply of "Darby and Fisher's Students' Guide to Submarine Cable Testing," fifth edition, one of the most popular books on this important subject.

The book contains 240 pages and deals with all tests and measurements made in modern submarine cable practice. An appendix is included which contains answers to all questions presented in the main work.

The price of the book is $4.50 and copies may be had from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

ALEXANDER GRAHAM BELL arrived in the United States from Canada in the year 1872.

## THE CABLE.

JAMES R. BEARD, of the Central and South American Telegraph Company, on October 11 started on a trip of inspection to South American cable stations. Mr. Beard will travel down the west coast and return by way of the east coast of South America.

THE CENTRAL AND SOUTH AMERICA TELEGRAPH COMPANY, the All American Cables System, on October 6 moved from No. 64 Broad Street to No. 89 Broad Street, New York.

DON H. CAMERON, assistant superintendent, Western Union Cable station, North Sydney, N. S., is at the St. Pierre cable station on company business.

MICHAEL FITZGERALD, a member of the French Cable Company's staff at the Orleans, Mass., station, and widely known in telegraph and cable circles, is the author of a book entitled "1812; A Tale of Cape Cod." Mr. Fitzgerald gives a dramatic presentation of an episode in naval history with which all Americans should be familiar.

GEORGE S. HALL is superintendent of the French Cable Company's station at Orleans, Mass. Other members of the staff are: James Dickie, Ralph Deschamps, Lewis H. Delano, and Joseph Bouroult

FREDERICK SUGG, for nearly thirty-five years employed in the service of the French Cable Company, Orleans, Cape Cod, died on September 15, after a long illness. Mr. Sugg was born in Sherborne, Derbyshire, England. He is survived by his wife and three of his five children.

THE ITALIAN ADMINISTRATION announces that messages to or from Germany, German Austria, Bulgaria and Turkey, will again be allowed transit through Italy if written in plain language.

A CENTRAL BUREAU for registering cable addresses has been organized with headquarters at 31 Broadway, New York. The name of the Bureau is "Central Bureau for Registered Addresses." A charge of $2.50 per year is to be made for each cable address registered with the bureau.

### Cable Code Difficulties in Spain.

On a number of occasions, firms in Barcelona, Spain, have requested assistance of the American consulate general in decoding commercial cablegrams received from business houses in the United States. Frequently the messages are in codes that are not on file in the consulate, or available in Barcelona. It is suggested that the publishers of codes send copies of their latest editions to the American consulate general at Barcelona, Spain.

THE ANNUAL REPORT on railway statistics, issued by the Department of Railways of Canada, shows the earnings of the railways from telegraph and telephone services for the year 1917, as $328,295, and for 1918, as $281,168.

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## RADIO TELEGRAPHY.

### Marconi Notes.

J. C. H. MACBETH, managing director of the Marconi International Code Company, Ltd. London, sailed for England on the *Carmania* on October 8.

MESSRS. PICKENS AND WRIGHT, of the English Marconi Company, who have been at the Louisburg, C. B., transoceanic station for some months, sailed for home on the *Mauretania* on October 1.

WILLIAM VERNON MOORE, R.N.R., warrant officer, passed through New York recently en route from St. Lucia (where he was in charge of H. B. M. Radio Station) to London to be demobolized. Mr. Moore was a member of the Marconi transoceanic staff in New York prior to the war and expects to return here. He served in the Belgian Congo, where he had a run of climatic fever and received a wound in the leg; he also received several citations from England and Belgium.

E. J. NALLY, vice president and general manager; R. A. Weagant, chief engineer and David Sarnoff commercial manager, have returned from Washington, where they testified to the Senate and House Committees regarding radio matters.

S. W. DEAN, of the engineering department, has been transferred to the transoceanic station at Marshall, Calif.

THE MARRIAGE of Miss Marylee Nally to Frederic Hahm took place on October 4 at the bride's home in Ossining, New York, on the Hudson. She is the daughter of E. J. Nally, vice-president and general manager. Mr. Hahm is a Weslyan man and served during the war as a lieutenant in the naval air service.

### Vacancies for Radio Operators.

The Marconi Wireless Telegraph Company needs operators for vacancies at the high power stations at Belmar, N. J., Chatham, Mass., and New York. The requirements are good sending and correct reception in code and plain language at a speed of twenty-eight to thirty words per minute. Sounder reception, punching perforated transmitting slip, receiving automatic received signals and touch system typewriting are recommendations. The positions will be permanent.

L. L. LYNN, former manager of the Marconi office in Chicago, Ill., has taken a position as radio instructor with the Chicago Telegraph Institute.

### Division Superintendents of the Marconi Company.

Eastern Division, John B. Duffy, New York; Southern Division, Frank Chapman, Baltimore, Md.; Pacific Division, A. A. Isbell, San Francisco; Gulf Division, Julias A. Pohl, New Orleans, La.; Great Lakes Division, Edwin A. Nicholas, Cleveland, Ohio; marine superintendent at San Francisco, Lawrence A. Malarin; district superintendent at Boston, George W. Nicholls; district manager at Philadelphia, Pa., Lee Manley.

WALTER JAMES HOWELL, for some time radio inspector in the service of the Sperry Gyroscope Company, has been appointed instructor in the Marconi Company's school at 25 Elm Street, New York.

THE MARCONI COMPANY'S Poldhu station now accepts radiograms for ships which are not within the range of any other British coast station. The Poldhu station communicates with ships at night only, and its range is 1,500 miles.

### Wireless Telephony.

Radio amateurs and enthusiasts in the vicinity of New York who have receiving outfits have had interesting entertainment during the past few weeks listening to the radio telephone tests being carried on between the De Forest laboratory and Ossining, N. Y. Even those who have ordinary crystal sets have been able to listen in, provided they had means for effecting sharp tuning. The voices of engineers Gowan, Logwood, and Schilling are easily distinguished and the transmission is as clear as if through a short speaking tube.

AT THE ELECTRICAL SHOW in New York, held during the first week in October, exhibits and demonstrations were made by the De Forest Radio Telegraph and telephone Company; The Wireless Improvement Company, New York; Federal Telegraph and Telephone Company, Buffalo, N. Y.; and L. M. Cockaday and Company, New York. The latter concern exhibited a direct current radio transmitter, in both cabinet and panel forms. In this set a rotary interrupter is used in the primary circuit and a synchronous rotary spark-gap in the oscillating circuit, producing a clear, piercing note. The interrupter and spark-gap are inclosed in an aluminum case and are noiseless in operation. The sets are made in one-fourth, and one-half kilowatt sizes.

H. N. SLAUGHTER, lieutenant-colonel in the Signal Corps, engaged in the development of radio apparatus for all branches of the United States Army during the late war, has returned to the Western Electric Company in the capacity of research and development engineer.

LIEUTENANT BOWDEN WASHINGTON, who recently resigned from the radio department, United States Navy, has resumed duty with Cutting and Washington, manufacturers of radio telegraph apparatus for shipping interests. Mr. Washington assumes the title of vice-president and chief engineer of the company.

### Radio Buzzer Sets.

TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York, can supply buzzer sets for learning the continental alphabet by means of buzzer signals, the same as heard in telephone receivers used in regular radio working. These sets are equipped with key, high-tone buzzer, and flash lamp signal, complete on one base. The price is $3.50 for the set.

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## British Cable and Wireless Services.

EMPIRE PRESS UNION'S REPORT.

In response to an invitation from Lord Milner's Committee, appointed to deal with the subject of improved cable facilities, the Empire Press Union selected a sub-committee to offer suggestions for that object. Though the sub-committee consisted of gentlemen immediately connected with the Dominions and Indian press, its deliberations were intended to cover the needs of the general public as well as those of the newspapers. We give below a brief abstract of the sub-committee's report.

The commercial classes and the press have suffered together during the past four years of cable chaos. The Eastern cables suspended, for a time, the transmission of messages at press rates, and press messages sent to the antipodes on the already overcrowded Pacfic cable were so heavily delayed as to be almost worthless when they arrived at their destination. The newspapers were not spared this disappointment though they used the full rate of 3s. a word for the majority of their communications—a charge of five-fold the press rate tariff. On the Eastern service the Government wordage rose from a pre-war average of 3,000 words a day to over 50,000. For many weeks the Eastern route was so heavily loaded with work for the Far East, and chiefly for the Government, that the Eastern companies declined to take any press or public messages to the southern hemisphere. India was long ago deprived of the old Indo-European line, and was compelled to take many cable messages through America and Japan; the whole Australian service was thrown upon the Pacific route of a single wire line. Now that the war has ended, it is possible to consider how an improvement can be brought about. An extension of the wireless system has many advocates; wireless has great potentialities, and it has already made great strides. It is for the Government to settle whether wireless should be in public or in private hands. India has an efficient internal system for the uses of the Government, but no regular connection with the world systems. The erection of at least one station of very high power would put all India into communication with high-power stations in other parts of the world. There is so great urgency for improved communications that as a provision of large wireless stations can be more speedily effected than the laying of long sea cables, this committee recommends that no time be lost in deciding how an extension of the wireless system will meet the needs of the hour. Wireless messages from Carnarvon have been picked up by relatively small apparatus in Australia; also small receiving instruments in operation in India obtained the first authentic news of the German losses in the Jutland fight by picking up wireless messages of the German Government. This committee is assured that the world communications by wireless would be greatly facilitated if extra powerful stations were built in India, Australia, Montreal, and Vancouver. But it may be some years before transmission of messages by wireless can approach the certainty that is now attained on cables, and however good wireless may prove to be, cables are not likely to be supplanted. Unfortunately, the cables have to make up great leeway. The Eastern Company hopes to finish a new cable from England to Gibraltar before the end of October. It has a project on hand for an additional cable from Malta, down the Red Sea to Singapore, and it is hoped that in two or three years this work will have been completed. If subventions have increased commercial communications by mail, it is reasonable to expect that a well devised system of cable subvention will also be fruitful of good results. It was by a sound system of subvention that the Pacific cable was brought into existence, and the flow of traffic is now sufficint to relieve the guarantors of all responsibility. Without that means of communication the world would have been paralyzed during the war; the Pacific cable was able to carry not only the messages of the Australian Government, but it proved of great assistance to home authorities when the Eastern cables were overcrowded, or broken down. It is a marvel that the Pacific cable has lasted seventeen years without a fracture in its deepest part. Unfortunately, the Pacific cable has one long unbroken stretch of 3,980 miles, which section constitutes the bottle neck of the whole service. In order to make sure of that route being maintained a new cable should be laid throughout—from Bamfield to Norfolk Island, and certainly, in the first instance, from Bamfield to Fanning Island. This would be an important link in the "All Red" route which the Empire Press Union has advocated for several years; the necessity of the "All Red" route is admitted by every authority. It may be considered that the Government's acquisition of the German cable to America *via* the Azores, now extended to Halifax, is sufficient for the Atlantic link of that route. But it is not a quick cable, and it is in the hands of the bureaucratic post office. When the large number of American-owned cables that cross the Atlantic are remembered, and the favored treatment of American press messages, it is surely not too much to hope that a British Empire cable will soon be laid from Ireland to Newfoundland, whatever use may be made of the newly acquired cable *via* the Azores. The link from Halifax to Bamfield is already covered by the Pacific Cable Company's lease of the Canadian Pacific Railway wire. That wire is not a Government property; it works well westwards from Montreal, but between London and Montreal there is frequent trouble. It is a matter for consideration whether the Pacific Cable Board could not take over the ex-German cable, *via* the Azores, from England to Halifax. Since the armistice, and notably this spring, up to 1,000 words a day were sent under the 3s. rate. For two or more months the Eastern Company could take no public or press cablegrams of any kind. Owing to the breakdown of several of its wires, the company was unable to handle anything more from London than the very heavy Government messages. Another important improve-

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ment in the cable service that would be welcomed would be the creation of an "urgent" rate between England and Australia. Thirty-one countries accept "urgent" telegrams; these messages take precedence of other private telegrams, and are charged for at triple rates. Great Britain is not among the 31 countries referred to. This is a matter of great importance to the public as well as the newspapers.

To sum up, the committee suggests that:—

1. Immediate steps be taken to improve the existing cable services by reducing the wordage of Government messages, and otherwise relieving the present congestion on the wires.
2. Every possible assistance be given by the Government to the cable companies to enable them to expeditiously repair their lines.
3. An adequate system of wireless be established as soon as possible.
4. A second cable be laid without delay, as a part of the "All-Red" scheme, from Bamfield to Norfolk Island, and certainly, in the first instance, from Bamfield to Fanning Island.
5. Better use be made of the ex-German Atlantic cable.
6. Subventions be granted with a view to reducing cable and wireless rates, in order to encourage intercommunication between all parts of the Empire.
7. The deferred press tariff should be resumed, and extended as soon as possible to South Africa and India.

## South American Telegraph Notes.

President Pessoa of Brazil has appointed Gires de Rio Minister of Communication.

In the year 1918 the length of the telegraph system of Brazil aggregated 26,100 miles as compared with 24,600 miles in 1917. At the present time there are 2,400 miles under construction. In 1918, 5,350,606 telegrams were transmitted, or 945,156 more than in 1917.

In Nicaragua the government has taken steps toward the erection of long range radio stations at Bluefields and Cape Gracias a Dios to be used mainly for the transmission of government business.

It is reported from Mexico that a large radio station is to be erected at a point in Lower California capable of direct communication with Mexico City, Progreso, and ultimately with Japan. At Salina Cruz work has commenced on a radio station intended for communication with Panama, San Salvador and Cuba.

In Panama, new rates for telegraph and telephone messages on government lines became effective July 1, 1919.

## Books on Wireless.

TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York, is headquarters for all books on wireless telegraphy. Those desiring such books should send for our price list. We make it our business to fill all orders the same day they are received.

## Forest Fires Trap Operators.

RADIO AND THE AIRPLANE TO THE RESCUE.

The forest fires which swept northern Ontario during June and July of the past summer caused a considerable amount of damage to railroad property, and no end of hard work and inconvenience to telegraphers located at stations along the Canadian transcontinental railroads.

Many of the small villages along the Canadian National Railways lost cottages, sawmills, thousands of cords of pulpwood and logs and in several places the entire previous winter's cut of lumber was destroyed by the fires.

There was an incident at Tashota, on the Canadian National Railway, wherein there was a narrow escape from death by the principals, and in which the use of wireless telegraphy and the airplane were resorted to effect a rescue. Operator Adair of Tashota, with his wife and children, were spending the day fishing at Pine Lake several miles from the railroad, and when they came ashore and started through the woods for home they were confronted by a solid sheet of flame in the pine woods, burning fiercely and traveling rapidly. Returning to the lake shore Mr. Adair set up a pocket wireless telegraph outfit he had in his kit and within a short time attracted the attention of the operator at the depot, at Grant station, miles away, where there was also a wireless outfit permanently connected. Operator Cordingly, at Grant, being the owner of a Curtiss flying machine, immediately got under way and within twenty minutes had located the marooned party on the shore of the lake, by this time all of them suffering from the effects of the dense smoke.

A prompt use of the safety first kit, a part of the airplane equipment, soon restored the party, after which all were taken aboard the machine and, although the load was too heavy for the airplane to get above the trees for the flight home, the pilot made for the center of the lake where the air was purer and where the flames and heat could not reach them. From here communication was again established with the station at Grant and arrangements made for a relief party to travel over a designated roundabout path to a point on the lake shore where the party could land with safety.

The entire party reached the railroad very little the worse for their experience.

An exciting event occurred while the party were floating in the rescuing plane on the surface of the lake. A pack of wolves chased an almost exhausted red deer to the shore of the lake, and operator Adair, who had with him his big game rifle, shot and killed eight of the nine wolves, the carcasses of which were carried back to town by the members of the relief party.

We predict that this account of life along the lines of railroad stretching through northern Ontario will result in the Canadian National Railways being swamped with applications from telegraphers who wish to live a real man's life.

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# TRANSATLANTIC RADIO COMMUNICATION*

BY E. F. W. ALEXANDERSON

It has been demonstrated during the war period that transoceanic communication has become thoroughly reliable, every day in the year, and practically every hour in the day. Thus far, we can say, that the problem is solved. But a second question will be raised: What volume of traffic can be carried by the means at our disposal at the present time, and what is the relation of this radio traffic to the world traffic of to-day and to the world traffic of the future? The facts of the case are briefly the following:

Experience has shown that the wave lengths which are most suited for transoceanic communication lie between 12,000 and 17,000 meters. "This space in the ether" has already been taken up by five first class transmitting stations which, during the war period and up to the present time, have been in continuous service for transatlantic communication. Of these stations, two are in the United States, one in England, one in France and one in Germany. By extending the range of wave lengths down to 10,000 and up to 20,000 meters, and following the same system of intervals there would be room for about seven more stations or a total of twelve first class transmitting stations.

A first class station has such radiating power that its messages can be received in all parts of the world. This is one of the advantages of radio communication; but it implies that if such a station is to be used to full advantage it must have a "right of way" for its wave length over the whole world. Thus if we look at the matter pessimistically, without allowance for the improvements that further engineering developments are likely to bring, it would look as if the capacity of the world for first class radio stations would be about twelve. The rate of transmission at the present time from these stations is about twenty words a minute and it would thus be easy to figure out that the capacity of radio for handling any considerable portion of world communication would be totally inadequate.

The other side of the picture, which the radio engineer of the future must study carefully and closely, should indicate the technical possibilities for improving the situation. The tendency of present day developments points to the following means for expansion of radio traffic:

1. Increase in speed of transmission.
2. Improved selectivity based on the direction of the wave.
3. Improved selectivity making possible closer spacing of wave lengths.

As a basis of discussing the general situation it may be here stated as simple facts:

1. That signals have been transmitted and received at considerably more than 100 words a minute.
2. That signals have been received from Europe while an American high power station within comparatively short distance was radiating on the same wave length.
3. That it has proved practical to separate radio signals differing in wave length considerably less than 1 per cent.

Based on these facts, it is probable that the transmitting speed in the future will average 100 words a minute instead of 20 words a minute.

That the selectivity for direction of the waves will multiply by five the number of stations that may be operated on one wave length; and that the selectivity with reference to wave length will be improved so that the wave lengths of messages will be within 1 per cent of each other, instead of 7 per cent which is the spacing of the stations at present.

These prospects, taken in combination, give us an optimistic picture in which the possible capacity for transoceanic radio traffic of the world is 175 times as great as it is with the practice of to-day.

To claim that the traffic capacity could immediately be increased nearly 200 times, would be an exaggeration, because the different improvements which have been made may partly conflict with the execution of each other if they are to be used simultaneously. This optimistic picture is therefore to be regarded as a goal—perhaps never to be reached, but it points the way for almost unlimited possibilities for progress by continued engineering efforts.

In order to avail ourselves of these three improvements simultaneously, the transmitted wave must be a continuous wave which does not "spill over" with harmonics, decrements or variations, into the range of wave length assigned for other communication. When wave lengths are spaced 1 per cent apart, each wave must be sufficiently pure so as to have no objectionable components outside the limits of one-half of one per cent. While rules to this effect should be rigidly enforced it must be appreciated that there are certain fundamental limitations.

## HIGH SPEED SIGNALING.

Modern transoceanic radio signaling is conducted by means of continuous waves. It must be appreciated, however, that signaling by an absolutely continuous wave would be impossible, because the making of dots and dashes introduces increments and decrements in the radiation. It

* Abstract of paper presented October 1 at joint meeting, American Institute of Electrical Engineers and Institute of Radio Engineers, New York.

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will be shown that a repetition of increments and decrements can be resolved into a group of closely adjacent continuous waves. This agrees with the well known fact that the tuning of a wave with a decrement is known as a broad tuning. To illustrate this point we may take as a basis a signal at 100 words a minute (5 letters per word). If it is assumed that the increments and decrements in making the dots are not sharp interruptions but a continued variation by sine wave curves, it is found by an analysis that such a wave may be resolved into a group of continuous wave components within the limits of 40 cycles above and below the average. This is the theoretical minimum width of the band of wave lengths which are necessary to transmit 100 words per minute. If the dots are defined by sharper interruptions the wave becomes still "broader" and it would not be unreasonable to say that the minimum practical band of wave lengths for 100 words per minute is 100 cycles on each side of the fundamental. This would make possible a spacing of the waves 1 per cent apart when using a wave length of approximately 15,000 meters. Messages at a higher rate of speed will occupy a correspondingly wider "space in ether."

As a conclusion from this analysis it may thus be said that an increase of the speed to 100 words a minute and increase of messages to a spacing 1 per cent apart may be accomplished simultaneonsly provided that waves are used of such a character and modulation that they contain no radiation except the one needed to accomplish the intended purpose.

### DIRECTIVE RECEPTION.

The second means for increasing radio traffic consists in improving the selectivity by taking advantage of the direction of the waves. The author's paper printed in the *Proceedings* of the Institute of Radio Engineers, August, 1919, described a receiver referred to as the "Barrage Receiver", which was used to demonstrate directive reception. There are several other types of receiving devices, developed by the United States Navy and other investigators, which accomplish substantially the same purpose. The broad principle underlying all these directional receiving devices is the one discovered by Bellini and Tosi and generally referred to under their names.

In the U. S. Navy's tests of the "Barrage Receiver", it was proven that it is possible to carry on simultaneous two-way communication on exactly the same wave length. If this method of directive reception is carried out consistently in a world system of communication, it may be assumed that transmitting stations operating on the same wave length may be located—one in Europe, one on the American east coast, one on the American west coast, one in the Far East and one in South America. The American receiving station for European signals in such a system should be located east of the American Atlantic transmitting station, and in line with the Pacific transmitting station. Thus messages from the two American transmitting stations could both be simultaneously neutralized in the American receiving station by a "Barrage Receiver," while signals on the same wave length are received from Europe. Interference from the South American station may be neutralized by the use of a double barrage system, while the station in the Far East, though it may not to be exactly in line with two other, would be sufficiently near the general direction so that, considering the great distance, it would not cause interference.

If this communication system is to be duplicated on a number of other wave lengths, the practical conclusion follows that the transmitting stations as well as receiving stations for each district should be grouped in centers, and these centers located relatively so as to make the directive neutralization as effective as possible. The neutralization of several transmitting stations simultaneously may not always work out as first designed. It has been shown by investigations of the Navy Department that the radio waves do not always follow straight lines and not always the same path. However, discrepancies from such origin may again be overcome by further extending the principle of neutralizing waves from several directions simultaneously.

### CLOSER SPACING OF WAVE LENGTHS.

The method of increasing traffic capacity by closer spacing of wave lengths has great possibilities. It has been shown that the selectivity with reference to wave length can be greatly increased by several successive tunings in either the radio, the audio or some intermediate circuit. It is thus entirely practical to receive either by ear or by photographic records, signals which are considerably less than 100 cycles apart. The theoretical limits for such selectivity in connection with high speed transmission are defined below. A high speed message is not a single continuous wave, but a band of wave lengths—100 words per minute occupying a space of about 200 cycles. Therefore the same degree of selectivity is not to be expected with a high-speed signal if the interfering radiation is of considerable intensity.

### THE RADIO TRANSMITTING SYSTEM.

Several types of radio transmitting systems are at present in use with a high degree of success. Generally speaking, any radio transmitting system consists of three essential elements:

1. The generator of radio frequency energy.
2. The modulating system, whereby the energy is controlled so as to produce the dots and dashes of the telegraph code or the modulations of the human voice.
3. The antenna or radiating system.

### THE MULTIPLE ANTENNA.

The antenna of the New Brunswick, N. J., station represents a new departure in the method of radiation. The old antenna structure was originally one of the horizontal Marconi antenna, 5000 ft.

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(1500 m.) long, 600 ft. (180 m.) wide supported on towers 400 ft. (120 m.) high. The original antenna had a resistance of 3.8 ohms.

The antenna as operated now has a resistance of 0.5 ohm distributed approximately as follows:

| | |
|---|---|
| Radiation resistance..... | 0.07 ohm |
| Tuning coils and insulation.. | 0.10 |
| Ground resistance..... | 0.33 |
| Total multiple resistance... | 0.5 ohm |

The reduction in total resistance of the antenna is due to the reduction of the ground resistance. While the old antenna had one tuning coil located in one end, the new antenna has six tuning coils.

### THEORY OF THE MULTIPLE ANTENNA.

The theory of the multiple antenna can be explained in several ways. Without going into details, an explanation will be presented giving the point of view which has proved most useful for general discussion. For this purpose the multiple antenna may be considered as an aggregate of several antennas of the ordinary vertical type each having its own tuning coil. When regarded in this way, the multiple antenna in New Brunswick is equivalent to six independent radiators placed 1000 ft. apart. The ground resistance of each of the radiators is 2 ohms, the coil resistance 0.6 ohm and the radiation 0.07 ohm making a total resistance of 2.67 ohms. Each of these radiators has an aerial 1000 ft. long and 600 ft. wide, counted at an average height of 300 ft. A total resistance of about 2.67 ohms is, as a matter of fact, the resistance to be expected from an antenna of such dimensions and ordinary design. If one individual antenna such as described is operated with a radiation of 100 amperes, the energy consumption of the antenna would be 26.7 kw., and the radiation efficiency would be 0.07 ohm divided by 2.67 ohms which is 2.6 per cent. If it is desired to increase the radiation from 100 amperes to 600 amperes the energy consumption would be 36 times as great; that is, 960 kw. There is, however, another way to produce a radiation equivalent to 600 amperes. If six separate antennas of the dimensions described were built and each operated with a radiation of 100 amperes, each antenna would emit a system of waves proportional to 100 amperes radiation. If all the waves emitted by the six antennas were in phase, the amplitude of the combined wave would be six times as great as the wave emitted by one antenna. Thus the amplitude of the combined wave would be equal to the amplitude of the wave emitted by one antenna when operated at 600 amperes. The energy consumption required for operating one antenna was 26.7 kw., thus it might off-hand be concluded that the energy consumption required for operating the six antennas simultaneously would be 160 kw. This conclusion is not exactly correct because there is an interaction between the radiating effects of the different antennas resulting in a somewhat higher energy consumption. This might be expressed as follows:

The radiation resistance which is 0.07 ohm is common for all six antennas, whereas the ground and coil resistance of 2.6 ohms belongs to the different antennas, individually. Thus the combined circuit of the multiple antenna can be represented by the common radiating resistance of 0.07 ohm connected in series with a group of six multiple resistance of 2.6 ohms each, so that the total current of 600 amperes flows through the 0.07 ohm radiation resistances which represent the ground and coil resistance of the individual antennas. Hence the total energy consumption of the combined antenna is found to be 180 kw. out of which 155 kw. is ground coil and insulation loss and 25 kw. radiation. The radiation efficiency of the multiple antenna is thus 14 per cent against the radiation efficiency of 2.6 per cent for the individual antenna. The above calculation is made for the present operating wave of 13,600 meters. If on the other hand the same calculation is made for the same length of 8000 meters, which has been found more efficient for telephonic transmission, it is found that the radiation efficiency is 30 per cent, the energy being distributed as follows:

| | |
|---|---|
| Radiation resistance..... | 0.2 ohm |
| Coil and insulation..... | 0.07 |
| Ground resistance..... | 0.33 |
| Total multiple resistance.... | 0.6 ohm |

For the sake of convenience in dealing with the radiation from a multiple antenna it has become the practice to indicate the total radiation from the multiple antenna as the sum of the currents measured in the six ground connections. The equivalent multiple resistance of the antenna is then determined by the equation $I^2R$ = energy consumption, where $I$ is the sum of the currents in the ground connection.

It has been assumed above that each of the individual antennas is operated so that the waves sent out by the same are not only of the same frequency, but exactly of the same phase.

### DIRECTIVE RADIATION.

The multiple antenna as described in its simplest form is adjusted so that the radiation from each of the individual oscillators is in phase. If, however, the antenna dimensions are so chosen that the phase displacement of the traveling wave between the different radiators becomes an essential factor, it is possible to obtain directive radiation. The radiated wave then will not be a simple circular wave but an interference pattern which may be treated like the corresponding phenomena in light and sound waves. Furthermore the phase displacement of the oscillations of the individual radiators may be regulated by tuning. Thus a variety of interference patterns may be created and analysis of these possibilities shows that an efficient unidirectional radiation by such methods should be possible.

Methods for unidirectional radiation have been established through the well known work of Bellini and Tosi. Through the courtesy of Mr. Bouthillon of the French Post Office, results of tests made in

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France have been placed at the disposal of the author, which show conclusively directive radiation by the Bellini and Tosi antenna.

With the dimensions of antennas used up to the present time, efficient directive radiation has not been practical. It has, however, been proved by various tests that the system of a central power source and a distribution system of energy to a large number of multiple radiators places at our disposal means for constructing radiators of dimensions of one wave length or more. The New Brunswick antenna (1500 meters long) has a minimum wave length of 8000 meters as a single antenna, whereas it can be operated as a multiple antenna at 2000 meters wave length. A detailed anaylsis of the possibilities of multiple radiation would fall outside the scope of this paper but the author is in position to predict with confidence that directive radiation on a large scale will not only prove practical but that it will be the most efficient method of radiation.

To add directive radiation to the proposed program for increasing the capacity of radio traffic would perhaps be premature until it has been demonstrated on a large scale. However, it deserves mention in order to show that new principles which may be utilized for still greater expansion of the radio technique have not yet been exhausted.

## A New Book on Radio.

Ellery W. Stone, the well known radio engineer, connected with the United States Radio Station at San Diego, Calif., has written a book entitled "Elements of Radiotelegraphy."

The author has succeeded in producing a book which covers in a logical way a study of the elements, the theory and the practice of wireless telegraphy. There is just enough historical reference to enable the student to gain a proper persective of radio invention and development.

All practical systems of radio signaling are described and illustrated, including the Marconi, Telefunken, Fessenden, Kilbourne and Clark, Haller Cunningham, Multitone, and Poulsen. What Mathematics is employed is of the simplest and easily worked out.

The book is of particular value to commercial and railroad telegraph students who are not familiar with advanced mathematics, and who desire to learn the operation of radio transmitting and receiving sets.

The book is bound in limp cloth and contains 267 pages.

Price, $2.50 per copy. From TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

IN THE YEAR 1868, Jamin and Rogers developed the rotating mirror method of observing the luminous oscillations of the alternating current arc.

## Money by Telegraph.

Twenty years ago the colored minstrels had a song which was popular, one verse of which ran:

"I find the Western Union of c-o-n-v-e-n-i-e-n-c-e,
No matter where I roam;
I'll telegraph my baby,
She'll send ten or twenty maybe,
And I won't have to walk back home."

Telegraph office managers of twenty years ago will remember that itinerant actors, commercial travellers who left home neglecting to pay lodge dues, and western homesteaders staking prospective brides to railroad fare, were the chief patrons of the telegraph money transfer.

The growth of the telegraph money transfer has been gradual, but has now reached large figures. The wide extensions of railroad facilities made it possible for families to scatter to all parts of the country, but it has remained that wide separation of friends does not lessen noticeably the need for an occasional hurried loan, and wide separation necessitates resort to the telegraph if the loan is to be hurried.

The chief gain, however, has been in the transfer of funds by commercial organizations. Modern business is conducted on close margins, and many of its transactions in order to be successful must be closed without even the delay that mail service entails. The extension of telegraph service to practically every city, town and village of any commerical importance, together with a well organized and conducted telegraph money transfer service, has made it possible for business interests to disregard distance and to carry on commercial operations with Bangor, Me., and Tacoma, Wash., as if these places were suburbs of Chicago, or New York, even to the extent of arranging for the payment of large sums of real money anywhere within an hour or two.

## Electrical Rules and Tables.

We have received a small supply of the twentieth edition of Munro and Jamieson's Pocket Book, containing electrical rules and tables. The book is pocket size and contains over 800 pages of up-to-date engineering data and circuit testing, electric conductors, telegraphy, telephony, radio, electrochemistry, Rontgen rays, batteries, dynamos and motors, transformers, electric lighting, magnetic measurements, etc. The price is $3.50 per copy, from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

THE FIRST Fast Sending Telegraph Tournament in America was held in Boston, in 1868. Among the contestants were: W. E Kettles, W. R. Plum, P. H. Burns, W. P. Phillips and W. D. Gentry.

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# INTERNATIONAL ASSOCIATION OF MUNICIPAL ELECTRICIANS

## CONVENTION AT CHICAGO

This year's convention of the International Association of Municipal Electricians, held in Chicago, September 23-26, was one of the most beneficial meetings the Association has ever held.

Dr. Charles P. Steinmetz, of the General Electric Company, Schenectady, N. Y., delivered an address on the subject, "Municipal Electricians in Relation to Electric Power Engineering." Dr. Steinmetz emphasized the point that municipalities and public utility corporations have many interests in common. The fact that the generation and distribution of electrical energy is now assuming national importance, Dr. Steinmetz stated, means that municipal engineers should broaden their views and aim to familiarize themselves with all phases of electricial development.

W. D' A. Ryan, director, Illuminating Engineering Laboratory, General Electric Company, Schenectady, N. Y., delivered a paper on "Effective Lighting for Streets." Mr. Ryan illustrated his talk with a large number of stereopticon colored slides, depicting the development of the art of lighting from early days to the present time. Slides showing the street lighting systems employed in several large cities were shown. Mr. Ryan called the attention of the members of the Association to the desirability of planning street lighting systems so that the fixtures used would beautify the streets as well as illuminate them. Referring to the many present installations of luminous arc lamps, Mr. Ryan advised that no unnecessary haste be exercised in displacing them with systems of later design.

Dr. M. G. Lloyd, of the Bureau of Standards, Washington, D. C., delivered an address, entitled "High-Voltage Pole Line Construction for City Streets." Dr. Lloyd reminded the Association that there is a growing tendency toward the employment of high voltages for power and lighting purposes. In the near future it will be necessary that wires carrying 11,000 volts shall be strung on poles erected in city streets, and the municipal engineers will have as a problem providing safeguards against contact of these high tension wires with low tension systems, and with grounded metallic structures. Dr. Lloyd also dwelt upon the importance of the strength of poles used to support electrical conductors. He pointed out that in all cases the stress must not exceed one-half of the ultimate strength of the pole and wires.

R. A. Smith chairman of the Standardization Committee, in his report submitted revised specifications on Class A standards dealing with fire-alarm telegraph systems, and Class B standards dealing with police signaling systems. Class C [illegible]rds; regulations covering the construction and repair of installations for heat, light and power, also were covered in this report. The Association adopted sections A, B, and C of the Standardization Schedule as the standard practice for municipal work. This is a permanent committee, and further schedules will be presented for adoption at future meetings.

"Electricity in Police Work," was the title of a paper presented by W. L. Potts of Detroit, Mich. Mr. Potts described the police signaling systems and methods used in Detroit.

W. G. KEITH, Commissioner of Gas and Electricity, Chicago, delivered an address on "Chicago's Novel Fire Alarm System," in which he described the system in use in Chicago, and which it is proposed to displace in the near future with a combined system of police and fire alarm apparatus. In the new system the signal boxes will be of a special design providing for both police and fire signals.

One paper not listed on the program, and which proved to be very interesting to the assembled members, was "The Work of the Signal Corps During the War," by Robert J. Gaskill of Fort Wayne, Ind. Mr. Gaskill is a past-president of the Association, and during the war was a captain in the United States Signal Corps.

During the convention opportunity was given members to make an inspection of the works and factory of the Kellogg Switchboard and Supply Company and of the Underwriters' Laboratories.

### NOTES OF THE CONVENTION.

Clark E. Diehl, president of the Association, in his main address reviewed the work accomplished by the officers and the committees during the past year, and took occasion to congratulate the members on their many acts of loyalty to the Government during the war period.

Will Y. Ellett, superintendent of fire alarm telegraphs, Elmira N. Y., who met with an accident a short time before the convention date, and who, it was thought would be unable to attend the convenion, managed to get to Chicago and participate in the deliberations.

Jacob Grimm, superintendent of police telegraphs, Buffalo, N. Y.. was present at the convention, but owing to an attack of rheumatism he found it necessary to use a cane in navigating the streets of the big city.

H. C. Bundy, fire chief, Watertown, N. Y., had the misfortune to fall, breaking a bone in one arm, necessitating the support of a sling..

Secretary Clarence R. George, of Houston, Tex., was accompanied to the convention by Mr. Cochrane, a newspaper man from Houston, who assisted materially in taking care of the press and clerical details of the meeting.

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## THE THERMOMETER.

By "The Doctor."

One of the most important if not the greatest department of a railroad, and yet one that has been given perhaps the least consideration in proportion to the vital part it plays in connection with the successful operation of a railroad, is the telegraph department. This is due primarily to its generally being considered a consumer and not a producer of funds, whereas it can be made a big producer of funds by bringing about a reduction in costs in almost every department.

The selection of its head and the necessary staff is made almost invariably from the view point of plant and construction, with admonitions to keep expenses down. The result at the present time in this particular branch of the service is, that progress has been made in development along mechanical and construction lines, whereas "message traffic," which is the life blood of the institution, has been neglected to such a marked degree that the circulation is materially impaired, and when collapse or stagnation is imminent, requisitions for additional help and facilities are approved, and, assisted temporarily by this new lease of life, it struggles along until the system becomes impoverished again, when similar treatment is administrated.

Figuratively speaking, this represents the condition on almost every railroad on the continent. It is generally conceded to be the inevitable and is charged up to increased business, lack of censorship, poor operators or to any other convenient and plausible excuse that suggests itself.

This is all wrong. The telegraph department has never been given the consideration by the railroad world that its peculiar relation to every other branch of the service justifies.

As this department handles the telegraphic correspondence of every branch of the service, it naturally follows that it should be recognized by all as occupying a very important posistion in the railroad organization, as it can be of very valuable assistance, if properly used, in locating the weak and expensive spots in other departments. Its archives offer many interesting and alluring avenues for research and study, and there is not the slightest shadow of doubt that failure to take advantage of this great opportunity in the past is chargeable, more or less, to the department itself, and is accountable to no small extent for deficits shown in the operation of railroads.

The telegraph department is really the "thermometer" as applied to the railroad body, and if given the consideration it merits, and the head of the department takes advantage of modern thought and practice, and above all, is supported morally and materially, not only by his superior officer, but by the heads of all departments as well, the "thermometer" will readily function and register the fever spots; and, once located, all that is necessary is a "diagnosis."

If you feel that the situation is critical, call in the services of an analytical expert, to make the diagnosis and apply the remedy. It is by far the surest, speediest and safest method to pursue. It stops the fever. It gets results. It gives new life to the patient. The expert when called immediately proceeds along scientific lines, proven and practical, and after a thorough diagnosis comprising among other things a "message traffic analysis," locates not only the cause of the trouble, but all other contributing diseases also, and once this is accomplished, like all expert practitioners, he will apply or indicate the remedy that will alleviate the troubles discovered and will speedily restore the patient to robust health.

The "message traffic analysis" frequently discloses cankerous sores in other departments of the system which need drastic remedies, and which would remain undiscovered were it not for the testing of the circulation of this important artery—the telegraph department.

The condition we find the department in today is one of long standing, and there are many contributing reasons for same; one of the most important I sincerely believe, is the fact that the general impression prevails on railroads that the "wires" belong to the company, that there is no charge for sending messages, and therefore should be used to the utmost, especially when a message can be dictated and written so much more easily and with less thought than a letter, overlooking the important fact that the telegraph wires have their limitations and that it takes two men and one wire to transmit a message to destination without relaying and when relaying is necessary it frequently requires six to eight men and three to four wires to perform the service.

The modern way of procedure in almost every branch of endeavor is to secure the benefit of the latest and best method of accomplishing the desired results, and this feature is being developed in the construction, mechanical and material branches which are being given the benefit of the best thought of electrical men in both the railroad and commercial field, while poor "message traffic", the reason for and the very life blood of the whole telegraphic institution, is permitted to flow on in its usual course unnoticed and unnurtured, while most of us remain innocently unmindful of the untold wealth that lies within its confines, and which could be easily uncovered by an analysis conducted along scientific lines.

Let us wake up. Get abreast of the times. Be live wires and remember that a big, broad, progressive and up-to-the-minute man is he who recognizes that the "world do move," that he cannot possibly be the last word in every branch of endeavor, and that the seeking of new ideas reflects credit upon him who forces himself out of a rut and takes advantage of the progress the world is making.

"Message traffic" should certainly receive the attention that its value and importance to the general structure justifies.

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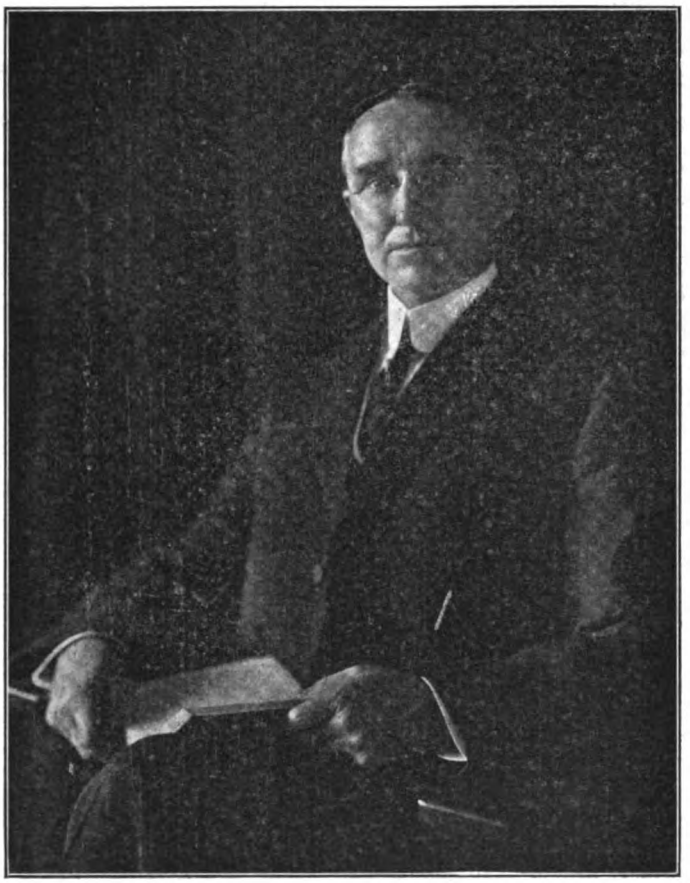
# POSTAL TELEGRAPH-CABLE COMPANY

## PORTRAITS OF SOME OF THE OFFICIALS



EDWARD REYNOLDS,
Vice-President and General Manager.

C. A. COMSTOCK,
Assistant to the General Manager,
New York.

JOHN J. WHALEN,
Traffic Manager, New York.

W. C. DAVIET,
Assistant to the General Manager,
New York.

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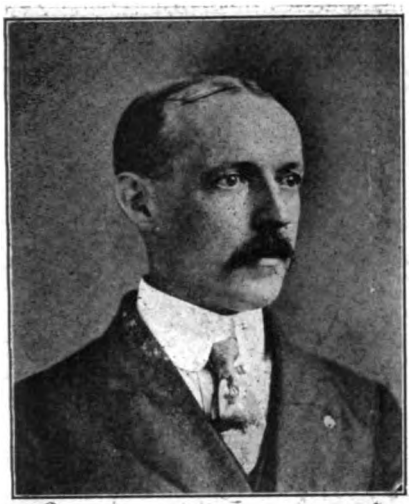
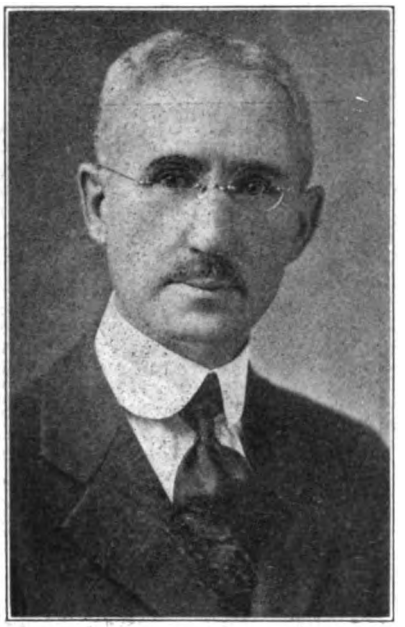


WILLIAM B. DUNN,
Secretary, New York.

WARREN S. HALLETT,
Superintendent of Supplies,
New York.



EUGENE P. TULLY,
Assistant to the General Manager,
New York.

K. F. STILES,
Superintendent, First District,
Southern Division, Richmond, Va.

W. W. MORRISON,
Superintendent, Third District,
Pacific Division, Los Angeles, Calif.

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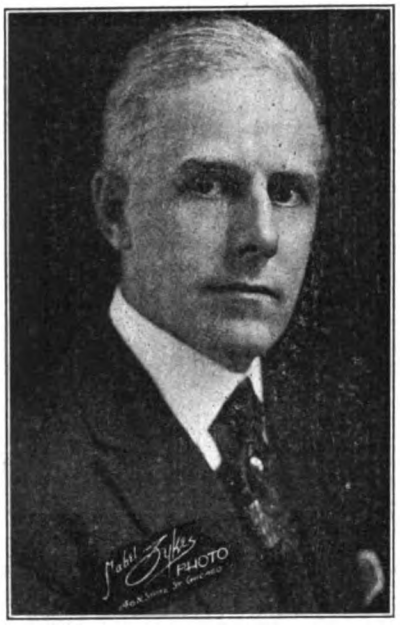

LEMUEL R. THOMAS,
Ass't Superintendent, Sixth District,
Western Division, Chicago.

H. E. PATTON,
Superintendent, Second District,
Pacific Division, Seattle, Wash.

H. C. SHAW,
Superintendent, First District,
Pacific Division, San Francisco, Cal.

V. E. BLUME,
Manager, St. Louis, Mo.

JAMES J. MCDERMOTT,
City Manager, New York.

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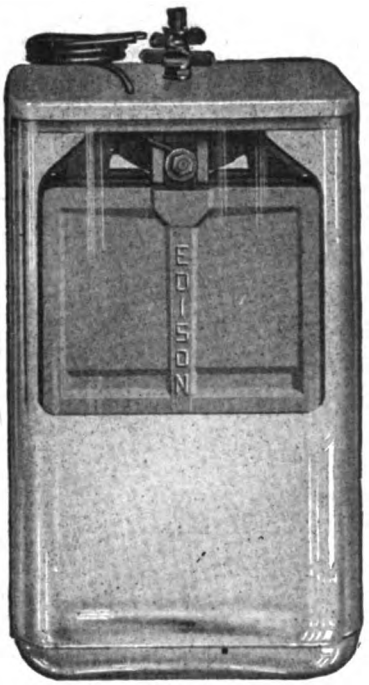
# FOR CLEAR TRANSMISSION

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# THE RAILROAD
## TELEGRAPH AND TELEPHONE

M. H. CLAPP, chairman of the Telegraph and Telephone Division, American Railroad Association, and manager of the Telegraph Section, United States Railroad Administration, Washington, D. C., was in New York October 2.

CHARLES R. HOSMER, director, Canadian Pacific Railway Company, and until a few years ago the head of the telegraph department of that system, has returned to Montreal from St. Andrew, N. B., where he spent the summer months with his family.

C. M. LAVOIE, ex-telegrapher and train dispatcher, has been appointed superintendent of the Laurentian Division, Canadian Pacific Railway, with headquarters at Farnham, Que.

J. M. MAIN, of Winnipeg, Man., deputy president, Order of Railroad Telegraphers, is a member of the National Industrial Conference which opened at Ottowa, Ont., September 15.

THE ELECTRICAL DEPARTMENT, Western Lines, Canadian Pacific Railway, having in charge installation, operation and maintenance of all electrical equipment, including electric lighting of buildings and trains, and heretofore under the jurisdiction of H. McConkey, superintendent of telegraph, Winnipeg, has been turned over to the mechanical superintendent's department. Mr. McConkey retains jurisdiction over the construction and maintenance of telegraph and telephone plant.

C. M. TRUSSELL has been appointed chief train dispatcher of the New Castle Division, Baltimore and Ohio Railroad, vice C. S. Steinmetz, granted leave of absence on account of ill health.

J. A. PHELPS has been appointed night chief train dispatcher of the New Castle Division, Baltimore and Ohio Railroad, vice C. M. Trussell, promoted.

### Grand Trunk and Grand Trunk Pacific Railways.

H. HULATT, manager of telegraphs, has returned to Montreal from a trip of inspection over the lines of the Grand Trunk Pacific Railway between Winnipeg, Man., and Prince Rupert, B. C. He found business conditions in western Canada in a flourishing condition. While on this trip Mr. Hulatt arranged a new schedule with the telegraphers employed in the commercial telegraph service.

H. JONES, formerly city manager, Grand Trunk Pacific Telegraph Company, at Saskatoon, who was granted leave of absence in 1914, having volunteered for military service, has returned after four years of service at the front, and has been appointed city manager at Prince George, B. C., vice Mr. Lalonde, resigned.

W. J. DAVIES, operator at Regina, Sask., has resumed duty at that point after returning from military service in France.

SUB-COMMITTEE B, of Committee No. 1, Telegraph and Telephone Division, American Railroad Association, held a meeting in New York, October 3. The subject handled by this sub-committee is "Wire Crossings."

The Committee framed its report to be made to the Division at the December meeting in Chicago, and decided upon the general plan to be followed in preparing its new specifications for wire crossings over and under steam and electric railroads.

The Bureau of Standards of the Federal Government expects to issue on or about October 15, a draft of its latest proposed revision of Section No. 28, Wire Crossings over Railroads, which will be sent to the railroads and wire-using companies for criticism. After the criticisms have been received, the Bureau will then issue its revised rules. Sub-Committee B will arrange to furnish the railroad representatives of its divisions copies of the latest Bureau of Standards' revision of Section No. 28, asking the railroad representatives to come to the Chicago meeting prepared to discuss this revision. In the meantime, Committee B will hold another meeting after the last revision of Section No. 28 has been received from the Bureau, and present its recommendations at the Chicago meeting, December 2, so that after discussion at Chicago, the Telegraph and Telephone Division may give its recommendations to the Bureau of Standards.

Those present at the meeting in New York were: E. C. Keenan, chairman, Martin H. Clapp, George A. Cellar, H. A. Shepard, J. C. Rankine, L. S. Wells and Stanley Rhoads.

COMMITTEE No. 6, Message Traffic, Telegraph and Telephone Division, American Railroad Association, H. Hulatt, chairman, held a meeting in Chicago on September 24, at which time the committee's report for presentation at the meeting of Division to be held in Chicago December 3, 4 and 5, was discussed and approved, and forwarded to the general secretary for printing and distribution.

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# INDUSTRIAL

THE IDEAL ELECTRIC AND MANUFACTURING COMPANY, Mansfield, Ohio, manufacturers of motors, motor-generators, and other electrical machinery, held a sales conference at the head office and works during the week of August 11, at which the company's representatives from all parts of the country were present.

THE PACIFIC TELEPHONE AND TELEGRAPH COMPANY, has declared a quarterly dividend of 1 ½ per cent. on preferred stock, payable October 15 to stock of record, September 30.

THE SPENCE ELECTRIC COMPANY, 136 Liberty Street, New York, of which J. L. Spence is president, is organized to manufacture electrical apparatus of all kinds used in railroad and commercial telegraph and telephone service. The company has in hand the manufacture of alternating current relays for district service, messenger call systems, and police and fire signal circuits.

THE ELECTROSE MANUFACTURING COMPANY, 66-82 Washington Street, Brooklyn, N. Y., of which Louis Steinberger is president, reports a steady and satisfactory demand for its insulating products. The growing demand in commercial and railroad telegraph and telephone service for cable terminal strips of fireproof material, and of high insulating qualities, has resulted in a wide field being created for this company's Electrose cable terminal strips.

THE REMINGTON TYPEWRITER COMPANY has ready for distribution an illustrated pamphlet containing information relative to typewriters best suited to the telegrapher's needs. A postal card to the company's address, 374 Broadway, New York, will bring to any telegrapher a copy of this pamphlet.

THE WESTON ELECTRICAL INSTRUMENT COMPANY, Newark, N. J. manufactures a radio frequency ammeter which is being extensively employed in radio telegraph service. The meter measures the potential generated at a thermo couple by the antenna current.

THE WESTERN ELECTRIC COMPANY, New York, has received orders from Denmark for two automatic telephone exchanges for the Copenhagen Telephone Company.

JOHN KELLY, for several years New York district manager of the Edison Storage Battery Company, has been appointed general sales manager, with headquarters at Orange, N. J.

### Non-Battery Sounder.

The relay attachment manufactured by the Railways Labor-Saving Device Company, of Davenport, Iowa, which takes the place of the local battery sounder, continues to meet with favor in both railroad and commercial telegraph service. As a reading sounder the device is satisfactory, and the cost of local battery sounder is avoided.

### Single Line Repeater.

The single line telegraph repeater manufactured by the Jester-Cooper Company, Houston, Tex., is being used successfully on several large railroad systems and in commercial telegraph service.

The management of this repeater is as simple as that of an ordinary single relay and sounder set, with which all telegraph operators are familiar. No local battery is required in its operation.

### A New Book.

Books which constitute a complete course in elementary electricity and cover in an understandable way all that the student needs to know in order to be qualified for engineering work, are not numerous. Most of the books now available which attempt to answer these requirements are in many respects out of date.

"Elementary Electricity and Magnetism," by Jackson and Black, is a book just off the press, and the authors have filled its 590 pages with theoretical and practical information of a thoroughly up-to-date character.

The book contains twenty-eight chapters with the following headings:

Batteries for Producing Electrical Currents, Electric Circuits and the Flow of Electricity. Ohm's Law, Electric Power and Heating Effects of Electric Currents, Electromagnetism, Nature and Properties of Magnetism, Electromagnetic Induction, Electrical Measuring Instruments, Electrical Measurements, Principles and Construction of Direct-Current Generators, Direct-Current Motors, Electrochemistry, Storage Battery, Principles of Alternating Currents, Inductance and Capacity in Alternating-Current Circuits, Alternating-Current Generators, Transformers, Alternating-Current Motors, Power Stations and the Distribubtion of Power, Electric Lighting, Electric Heating, Electric Traction, The Telephone, Electromagnetic Waves. Radiotelegraphy and Radiotelephony, Roentgen Rays and Other Rays, Modern Theories About Electricity.

A copy of this book should be in the library of every telegraph, telephone and radio student. The price is $2.50 per copy. From TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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# QUESTIONS AND ANSWERS

### Pneumatic Tube Air-Compressors.

W. W. R.—Usually air-compressors are rated in cubic feet of free air per minute, atmospheric pressure is very seldom specified. The capacity is ordinarily given as the actual piston displacement, or its equivalent, according to the type of compressor. There are, however, certain losses which reduce the volumetric efficiency below unity. A compressor cylinder with a cross section of one square foot, and a piston travel, or stroke, of three feet, with the cylinder filled with air at atmospheric pressure of 14.7 lbs. absolute, will perform as follows: when the piston has advanced to a point one-third the distance of its stroke the volume of air will be reduced one-third, and there will be three volumes compressed into the space of two, or the volume will be decreased in the ratio of 2 to 3; and since pressure varies inversely as the volume, accordng to Boyle's law, the pressure in the cylinder, due to the reduced volume, will be the original pressure increased in the ratio of 3 to 2, or $3/2 \times 14.7 = 22.05$ lbs. absolute = 1½ atmospheres = 7.35 lbs. gage.

### Oscillation Constant.

G. H. D.—The oscillation constant is found by extracting the square root of the capacity in microfarads times the inductance in centimeters. Your second question is not quite clear, but it may be the information you desire relates to the current and voltage at different points along the antenna. In this connection it may be stated that at the end of the antenna furthest away from the transmitter the current is at minimum and the voltage maximum.

### The Telautoprint.

N. E. C.—The Telautoprint was the name of a printing telegraph system invented by F. E. Gallagher and A. H. F. Schaar of Los Angeles, Cal., and exhibited in 1908. The instrument was introduced by the United States Wireless Printing Telegraph Company of San Francisco. The system was said to be applicable to wireless as well as wire telegraphy. We have never heard of its being used in actual service.

### Number of Railroad Telegraphers.

L. M. E.—The latest figures available showing the number of telegraphers employed on the 174 Class 1 railroads in the United States is for the year 1917. The figures show 5,143 train dispatchers and directors; 20,602 telegraphers, telephoners, and block operators; 7,677 telegraphers and telephoners operating interlockers; 11,185 telegrapher-clerks, and 19,303 agent-telegraphers, a total of 63,910. In the commercial telegraph service there are approximately 18,000 Morse telegraphers employed.

### Fessenden's Wireless Work.

M. L. C.—So far as our files disclose the information, the first article published by Reginald A. Fessenden on the subject of wireless telegraphy appeared in the *Electrical World and Engineer*, New York, June 29, 1901. As early as January, 1900, Fessenden conducted radio experiments under the direction of the United States Weather Bureau.

### Earliest Canadian Radio Experiments.

G. A.—The experiments conducted by Prof. Jerome J. Green, at the University of Notre Dame, Montreal, Que., in May, 1899, were very likely the first wireless telegraph demonstrations in Canada. The maximum distance covered in these tests was two miles.

### Air-Core Inductance Coil.

G. M. C.—A rough rule which will give approximately the inductance of an air-core coil, is: Multiply the square of the number of turns by the length of the mean turn in inches and divide the product by $(10)^8$. The answer will be in henries. For example: a coil having 186 turns, mean length 6 inches. Then $(186)^2$ times 6, times $(10)^{-8} = .002$ henry.

### Speed of Electric Waves on Wires.

R. W. M.—A formula by means of which the rate of travel of electric waves along metallic conductors may be computed, is:

$$\sqrt{\frac{2\omega}{C\left(\sqrt{R^2 + L^2\omega^2} + L\omega\right)}}$$

C. represents farads; R, ohms, and L henries. The answer will be in miles per second.

### Audion Receiving Set.

C. C. L.—You can now purchase an audion cabinet set, including 40-volt battery, adjustable condenser, fixed condenser, tuning inductance, telephones, battery, rheostat, audion and receptacle; all wired complete, for $40.00. To receive Arlington with this set the only additional apparatus required is a four-volt storage battery which you can purchase locally. This is a first class radio receiver set in every particular.

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# Electro-Physics for the Telegraph, Telephone and Radio Student

No. 15.

## Telephone Transmission.

Continuing the subject of telephone transmission begun in the previous lesson, it may be stated that in practice the capacity (C, in the formulas presented) is always greater than the inductance L. Inductance tends to reduce the attenuation and distortion brought about by the presence of electrostatic capacity. The energy of transmission of the electric waves of telephone transmission is reduced due to the effects of resistance and leakance, rather than by the effects of the capacity, and inductance present in the circuit.

To measure the transmission losses in a telephone circuit a standard circuit having arbitrary values is generally employed, and equivalents determined in comparison therewith.

A standard artificial line is so built up with capacity, inductance and leakage units, that it will balance the real line under test; that is, so that no difference in transmission efficiency will be evident when the terminal telephone sets are switched from the artificial to the real line, and vice versa.

An artificial line of arbitrary values which is used in practice has the following properties: A mile of standard cable with a mutual capacity of .054 microfarad per mile; loop resistance, 88 ohms per mile, and with inductance and leakance negligible. This is equivalent to a circuit made up of No. 19 B. & S. gage paper insulated cable. Other standards have been determined which are the equivalent of smaller gage conductors, such as No. 22 B. & S., now widely used in telephone service.

The transmission efficiency of a circuit is regarded as its equivalent to the standard circuit, measured in miles of standard cable. In a cable having the constants listed above the amplitude of an 800-cycle current flowing through it will be reduced about ten per cent after passing through one mile of the cable, and where it is necessary to provide equipment for a circuit wherein a reduction of ten per cent is allowable in not less than ten miles, employing the same frequency, then the cable required would permit of a transmission loss in one mile equivalent to the loss in standard cable in one-tenth mile.

It is to be noted that the term "miles of standard cable" does not mean that No. 19 gage wire with a loop resistance and mutual capacity as herein stated is the standard by means of which maximum transmission efficiency is obtained, but simply serves as a sort of yard stick by means of which circuits of a given efficiency may be designed for any length of line.

While in cabled conductors capacity and resistance are the chief factors to be considered, in aerial lines additional factors of inductance and leakance must be taken into consideration, as well as electromagnetic and electrostatic induction from foreign disturbing sources.

The attenuation of an open areial line, unloaded (without lumped inductance being inserted at proper intervals to balance the capacity), is:

$$\tfrac{1}{2} R \sqrt{C/L} + \tfrac{1}{2} S \sqrt{L/C},$$

where R, C, L, and S are resistance, capacity, inductance and leakance, respectively, the same as in the formulas presented in article No. 14, October 1 issue.

In open lines the leakance is subject to considerable variation due to weather conditions and to frequency. Ordinary weather changes may cause an attenuation variation of 20 per cent.

### GRADES OF TRANSMISSION.

For ordinary exchange local service the grade of transmission is regarded as satisfactory if equivalent to that of 18 miles of standard cable; long distance service, 30 miles of standard cable; railroad train dispatching circuits, 18 miles of standard cable; and railroad long distance talking circuits, 30 miles of standard cable.

*(To be continued.)*


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## SHOP TALK.

### The Trade Journal.

BY THE OBSERVER.

Somewhere, sometime, someone said: "It takes all kinds of people to make a world." If the statement had been: "It takes all kinds of tradesmen to make a world," I would feel like voicing my "Amen."

Practically, all of the prominent, active trades have a trade journal catering exclusively to the needs of those engaged in the various lines of business. In the columns of these journals are published timely articles written by workers in the field. Very few of these articles tell of patentable inventions, but generally abound with suggestions for the betterment of working conditions.

Relative to the material which appears in trade journals, one often hears the remark: "Oh, I read a similar article to that ten years ago!" Or, "Why don't they get something new?"

Now, the fact is there is much new matter in practically every issue of a trade paper, but there are some readers who mistake new ideas for old ones. Real progress generally is the result of evolution. Many of the old ideas have required a deal of furbishing over a long period of time before they became of practical value, and it is the little forward steps that are made as time goes on that mark improvement and progress. What you may have seen ten years ago as a new idea may have resembled what you saw described in a late issue of a trade paper, but the later reference in reality shows what some thinker and plodder has done with the original idea.

Every man who knows the business thoroughly and who has made substantial progress knows that it is necessary to read and re-read published articles many times in order to master the writer's ideas.

If all of the various trades were to call for something new and original every day there would be no experts in any line. It is only by doing the same thing over and over that we become expert.

Recently I read a book entitled "Essentials of Argument," by Professors Stone and Garrison, wherein it was stated that it would require one hundred and ten years for any person to complete all the courses taught at Harvard University.

Now, supposing a man's active life should extend to that length, how much of some of the earlier lessons would he remember at the finish of the series of courses?

My purpose, here, in bringing up this subject is to create an intelligent viewpoint toward the trade journal and its writers.

In the October 1 issue of TELEGRAPH AND TELEPHONE AGE, appeared an article entitled "The Edison Effect, and the Audion." It states that in 1854 someone had a new idea. The new idea was that a current of electricity could be passed through a gaseous medium separating two electrodes. Thirty years later Mr. Edison had the same idea, but elaborated on it and carried the experiments further along with electrical facilities that were not in existence in 1854. Still twenty years later, Fleming and De Forest, almost simultaneously, got the same idea but this time there was an immediate use for the phenomena, and the result is the Fleming valve and the De Forest audion, the wonder working receivers of radio signals. Suppose Edison had said: "It's an old idea," or that Fleming and De Forest had dropped the subject as soon as they learned that the thing in some form or other had been thought of before!

A good moral would be: "Do not throw an old idea in the discard until you determine if there is not some new application that may be made of its principles in the light of later advances." When the trade journal appears to be rehashing old ideas, go to the root of the matter and see what it is all about.

As to the relative value of text-books and the periodically published trade journal, it is, of course, true that the matter which appears in trade journals precedes by months what appears in text-books. Text-books generally are compiled from information which has already appeared in the technical periodicals.

Another good feature of the trade journal is its variety—and its low cost. "Variety is the spice of life," and regardless of old ideas, or articles, in a new dress, the trade journal is a colossal sea of variety.

### Signal Corps Message Advises of Impending Attack.

Two British Colonial soldiers who had returned home were exchanging accounts of their experiences during the war. One of them had been in France, the other in Palestine. The man who had been in Palestine was in the middle of a graphic recitation of how he and his fellows had cleaned up the Turks when the man from France interrupted him as follows:

"Garn, Garn, wite a minute bly-me. Yer fellows in Palestine never saw a binkum scrap at all. We heard that one night your Colonel got a telegram from one of your chaps saying there were 9,000 Turks two miles away, and immediate things hummed quick and lively to repulse the attack. When the defence was ready and your ambulances lined up, up comes your telegraph chappie with another message, and after reading it, your Colonel says: " It's all right boys, you can go to bed again: the message should have read, 'There are nine Turks 2,000 miles away.'"

### Telegraph Rates in Germany.

The Ministry of Posts and Telegraphs, in Germany, announced on September 14 that, beginning September 15, telegraph rates to Denmark, France, Spain, Norway, and other European countries would be raised 150 per cent.

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## OBITUARY.

### Death of Minnie D. Thompson.

Miss Minnie D. Thompson who has been in the service of the Western Union Telegraph Company, Chicago, as Morse operator and as timekeeper, for more than thirty years, died October 1. Prior to the advent of the present dispatching system and assignment of force, Miss Thompson aided the assistant chief operator in handling the unassigned forces, and had charge of the time sheets.

Miss Thompson was a highly competent, faithful, and loyal employee, and over a long period of years performed her duties regularly to the satisfaction of her official superiors, and at the same time won the respect and affection of all of her coworkers.

The funeral was held, October 3, at the home of Mrs. W. J. Leacock, Miss Thompson's sister, 5733 Ridge Avenue, Rogers Park, Chicago, interment being at Rose Hill Cemetery. Beautiful wreaths of flowers were forwarded by employees in both the Western Union and Postal Chicago offices, and by employees of the quad room, Western Union, New York.

DOROTHY BLOCK, nee Dorothy Johnson, died Sunday, October 5. The funeral was held at the Methodist church, Oak Park, Ill.

G. W. BROWNSON, SR., eighty-two years of age, and a forty-niner of the telegraph, died at Toledo, Ohio, on September 15. Mr. Brownson in the early days was a prominent member of the fraternity. He had been identified with railroad and commercial companies for fifty years. During his long career he was superintendent of telegraph of various systems. For the past twenty years, however, he had been in other business. G. W. Brownson, present city superintendent of the Kansas City office of the Western Union Telegraph Company, is a son of Mr. Brownson. It will be interesting to note that Mr. Brownson learned telegraphy in Poughkeepsie, N. Y., in 1849, at the time Professor Morse lived at that place.

JOHN E. BIERHARDT, manager at Syracuse, N. Y., for the Western Union Telegraph Company, during the past thirty years, died at Syracuse, September 17.

F. H. TUBBS, for more than thirty years superintendent of the Western Union Telegraph Company at Chicago, and a forty-niner of the telegraph, died in Chicago, October 4. Mr. Tubbs had been retired from active service during the past ten years.

### Ownership Statement.

Statement of the ownership, management, circulation, etc, required by the Act of Congress, of August 24 1912, of TELEGRAPH AND TELEPHONE AGE, published 1st and 16th days of each month at New York, N. Y., for October 1, 1919.

County of New York, } ss.
State of New York, }

Before me, a notary public in and for the State and county aforesaid, personally appeared Donald McNicol, who, having been duly sworn according to law, deposes and says that he is editor of TELEGRAPH AND TELEPHONE AGE and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in Section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1 That the names and addresses of the publisher, editor, managing editor, and business managers are:
Publisher, John B. Taltavall, 253 Broadway, New York.
Editor, Donald McNicol, 253 Broadway, New York.
Managing Editor, none.
Business Managers, none.

2. That the owners are:
John B. Taltavall, 253 Broadway, New York; Donald McNicol, 253 Broadway, New York.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are:
None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholders or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds or other securities than as so stated by him.

DONALD MCNICOL, Editor.

Sworn to and subscribed before me this 6th day of October, 1919.

[SEAL] J. R. FRITH.

(My commission expires March 30, 1920.)

Notary Public, Kings County, No. 50.
Certificate filed in N. Y. County, No. 122.

### Good Morse Operators on the P. R. R.

On the Pennsylvania Railroad they have a number of Morse telegraphers who are known from one end of the system to the other as expert senders. Good sending is a sort of a tradition on Pennsylvania Morse wires. The tradition has been established by operators Sam Howard, Joseph Leader, F. Newcomer, John Toy and Mr. Quinn. The operators who sign "B" in "Pu" office, Washington, and "Jo" in Jersey City office, are keeping up the record. Recently an operator assigned to "Ws" office in Buffalo N. Y., who signs "G", has done some wire work that has made the old-timers look to their laurels.

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# Telegraph and Telephone Age

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ANY NEWSDEALER in the United States or Canada can obtain copies of Telegraph and Telephone Age through the American News Company, New York.

BACK NUMBERS of this journal three or more months old will be charged for at the rate of 25 cents per copy.

No. 21. NEW YORK, NOVEMBER 1, 1919. Thirty-seventh Year

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### Visiting Officials.

At this time when many new officials are being appointed in the telegraph service it is pertinent to call attention to the matter of official introductions to subordinate employees, when new appointees make the rounds of the offices in their districts.

Many telegraphers remember the days when a manager or a wire chief arriving at the office in the morning occasionally found a stranger ensconced in the manager's chair, or perhaps looking through the log-book at the switchboard. Sometimes the visitor would affect oblivion of the existence of the local folks, until, perhaps, in the course of time he might ask to see the latest balance-sheet or the pay-roll; whereupon the natives were thankful that their caution, patience, instinct—or whatever it was—had operated to restrain them from being curious. For, of course, the stranger was indeed an official from headquarters.

Sometimes the visitor would have the happy thought to step up to the counter and write a "D. H." "Here to-day" telegram addressed to his office in the big town, at the bottom of which his name was signed, so that all might understand and be duly impressed.

Happily, most present day officials have in the past, and on their way up, had experiences such as those here recalled, and realize that there is a right way to pay a call at an office where they are not personally acquainted. It is necessary only to remember that there is not likely anything in your appearance which will herald you as a company official, or even as a telegraph man. There is also in the way the telegraph office rule that strangers must not be admitted to business offices or operating departments.

These, then, are the conditions to be realized: First, hand your business card to the man or woman in charge of the office in order to identify yourself, and then, in a general way, state the purpose of your visit, so that in the shortest time you may be put in the way of obtaining the information necessary to the work in hand.

It is not sufficient, nor is it satisfactory, to introduce yourself by name without tendering the regulation business card. Almost any stranger could impersonate a new appointee in that way.

Of course, on second and subsequent trips to offices it will be experienced generally that no formal introduction is necessary. If the local folks remember your attitude as courteous, constructive and helpful, on the occasion of your former visit, your reception on subsequent visits will be cordial and enthusiastic from the time your traveling bag is deposited inside the office gate.

### Printing Difficulties.

Owing to a controversy between New York pressmen's local organizations and the International organization, which resulted in several thousand pressmen leaving their posts, the October 16 issue of TELEGRAPH AND TELEPHONE AGE was delayed one week in getting into the mails. The present issue goes to press in time for distribution on November 1, but if subscribers receive their copies a few days late they are advised that the delay is due to a slowly moving accumulation of matter at the printing shop.

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# ILLUMINATION FOR LINE WORK TO BE DONE AT NIGHT

## A PRACTICAL AND INEXPENSIVE LIGHTING UNIT

By B. J. SCHWENDT
Superintendent of Telegraph, Toledo and Ohio Central Railroad, Hocking Valley Railroad, etc.

Although there are various kinds of night lights in use for night work on telegraph and telephone lines, and for track signal work, the one described and illustrated herewith has proved of superior utility where a reliable and compact portable lighting unit is necessary.

The unit is in use on the lines of the Toledo and Ohio Central Railroad, Zanesville and Western Railroad, Kanawha and Michigan Railroad, and Kanawha and West Virginia Railroad.

Fig. 1 shows lineman with entire lamp equipment, consisting of a Ford gas headlight lamp equipped with a special carrying handle and supporting base welded into one frame so that the lamp may be removed by loosening the usual lamp set-screws. The picture also shows the connecting hose and motorcycle-size acetylene tank with carrying strap.

It may be noted that the carrying handle is bent so that while being carried for lineman's use the light will be automatically directed upward in the direction of the wires.

Fig. 2 shows a lineman carrying the lighting unit while climbing a pole.

Fig. 3, showing lineman working at the top of a pole, illustrates how the unit may be suspended by means of the carrying handle, from the cross-arm, a sufficient amount of illumination being supplied to carry on wire work of any nature.

Fig. 4 illustrates the use of this lighting unit as a headlight for motor cars where it is necessary for linemen or maintainers to make night trips. Suitable fastening is provided on the deck of the motor car to hold the lamp in place, so that it will not become displaced due to jarring.

In actual service it has been found that an outfit of this kind will pay for itself in a short time; especially in cases where it becomes necessary to clear line troubles at night in order to avoid delays to circuits, which otherwise would have to await daylight before repairs could satisfactorily be made.

It is, for instance, an easy matter to discover wire crosses by means of the light. Linemen state that crosses may be more readily discovered in this way than with daylight. Also, in case of wreck or other dislocations at night, trouble may be quickly cleared.

The cost of this efficient lighting unit is as fol-

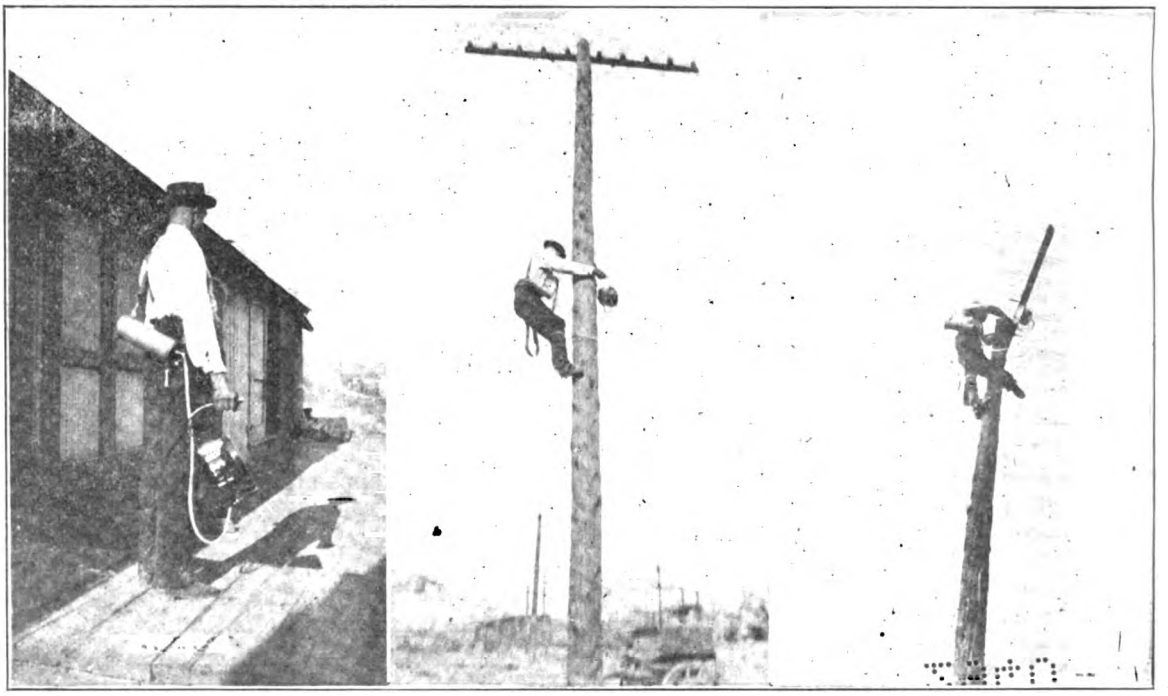

FIG. 1. FIG. 2. FIG. 3.

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lows: one Ford headlight gas-lamp $3.52, four feet of rubber tubing 80 cents, two hose clamps 8 cents, one union 3/8 inch clamp 30 cents, ten feet 3/8 inch round iron including one wood handle 20 cents, blacksmith's labor in fitting $1.10, one motorcycle-size acetylene tank $8.00. and one charge of gas for tank 50 cents; a total of $14.50.

One charge of gas will supply the equivalent of from 23 to 26 hours burning of the lamp at full-size flame. The full flame is not always necessary, and the number of hours illumination may be correspondingly increased. The weight of the outfit is 18 pounds.

On the railroads enumerated in the second paragraph of this article, the storekeeper of the signal and telegraph department keeps in stock a few charged tanks, and linemen or maintainers working on the line can procure extra tanks by express or baggage car simply by wiring for same. Empty tanks are returned to the storekeeper. The supply of tanks is maintained at a point where empty tanks may be quickly exchanged for charged tanks at a local supply station. The tanks may also be recharged at almost every automobile service station such as are found in the larger towns.

Unquestionably the work of line repairs is greatly facilitated where these lighting units are employed. Permanent work instead of temporary repairs may be made, and linemen do their work with greater safety.

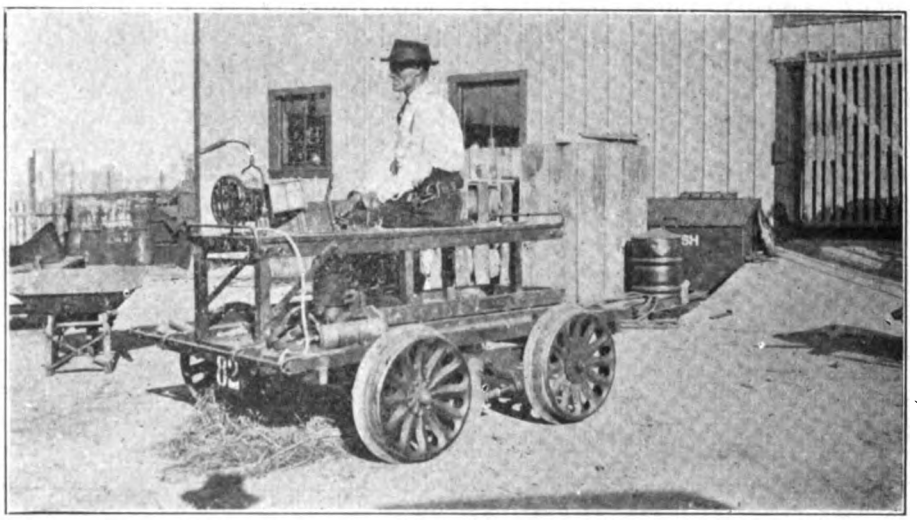

FIG. 4.

### How's This for a Railroad Jam?

Only two locomotives remained in all Roumania when the Red Cross entered that country last winter on its errand of mercy. The relief ship, bearing a large corps of workers and quantities of supplies, put into Constanzia, on the Black Sea. Everything had been destroyed by the German bombardment of that port. Only a hundred or so of the former population of 80,000 remained in the city, and no facilities existed for transport into the interior because the great bridge across the Danube at Cardov had been blown up in the heroic Roumanian retreat.

The Red Cross ship was obliged to await the thawing of the Danube. She then ran up to Galatz, where the cargo was sent on the first trains which ran through to Bucharest.

"Every place on the train was reserved," wrote a worker, "and the choice places were on the bumpers between the cars. The interiors were filled to suffocation. Peasants and their animals—pigs and poultry—occupied the roofs. Little wonder the train was crowded—the locomotive which drew it was one of the only two in Roumania."

### Transportation in Palestine.

Crossing the Dead Sea proved no easy task in a land where commerce is at a standstill and transportation facilities are virtually nil. A Red Cross engineer who recently returned from Palestine tells how it was done.

"It was necessary to carry a boat from Jaffa, on the seacoast, to Jerusalem in order to cross the Dead Sea to Jericho to get grain to take back to Jaffa. This journey of something more than one hundred and twenty miles was over an almost impassable terrain, some of it lowland, hundreds of feet below sea level, and much of it rugged, mountainous country. The Dead Sea itself is one thousand feet below sea level.

"This is typical of transport difficulties all over Palestine."

THE OLD WIRE CHIEF says: "It is the concessions we make for the sake of peace and a quiet life which permit to grow up the conditions that bring on wars."

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# WIND AND ICE DATA

## FOR USE IN CALCULATING THE CLASS AND NUMBER OF POLES REQUIRED FOR TELEGRAPH AND TELEPHONE POLE LINES.

BY STANLEY RHOADS.

The method of calculating the number and class of poles required for telegraph and telephone pole lines as given in the TELEGRAPH AND TELEPHONE AGE, October 1, 1919, assumes the wind and ice data to be known when the computations are begun. It was stated that the velocity of the wind should be the "fastest mile." This, of course, is to be the fastest mile observed during the winter months, December, January, February and March, which are the months during which ice is likely to occur. The decision as to the wind assumptions is made from the Weather Bureau records, and the ice assumption from the Bureau records and from the local experience in the district under consideration.

The fastest five-minute record for the district should be estimated by taking the record at the Weather Bureau stations in the vicinity that can be considered as being close enough, or in the same sort of territory, to be fairly representative of the district. Then convert the five-minute record into the "fastest mile" by adding thirty per cent. to it; as, for example, a five-minute record of sixty miles is equal to a "fastest mile" of ninety miles. Weather Bureau tests indicate that the above conversion is correct in order to get the fastest mile. It is also true that the gust velocity is very nearly the same as the fastest mile. As it is the gust or the fastest mile that turns the pole line over, it is very proper to use this value of wind in calculating the strength of pole to withstand the wind.

The fastest mile of wind should then be converted into the corresponding actual velocity for use in the wind pressure formula in order to arrive at the actual pressure in pounds per square foot that the wind will exert. Fig. VIII gives a chart for readily converting the observed fastest mile into actual velocity. In connection with this chart, it is interesting to note that doubling the wind velocity increases the pressure four times. The Tables

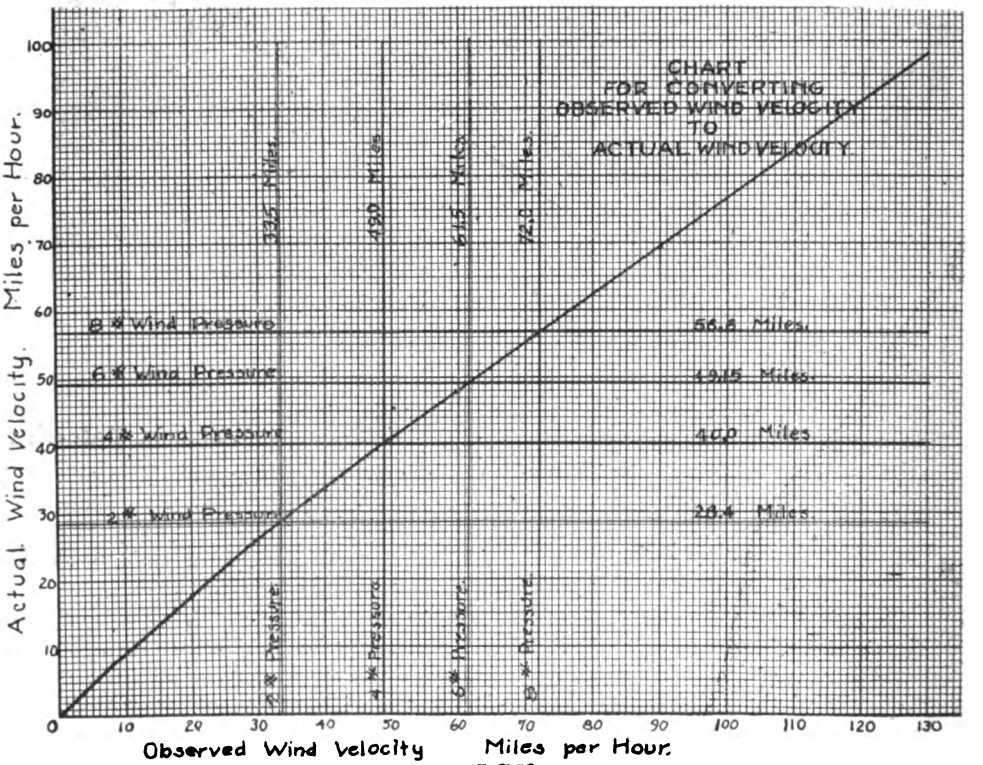


FIGURE VIII

giving the number and class required for different wind pressures show that eight pound territory (seventy-two gust, or fastest mile) requires four times as many poles as two pound territory (thirty-three mile gust, or fastest mile), yet the wind is only doubled. The chart of Fig. VIII shows that a reasonable division of the wind pressures has been taken in making up the pole tables.

The Weather Bureau has wind and ice records for a number of stations extending back in some

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cases forty-three years. These are given in Table IX. It is readily seen from these records that the ice data of the Bureau is decidedly meagre and insufficient for use in deciding on the loading conditions in any given territory and should be greatly reinforced by local experience in every case. The proper assumption seems to be that if ice forms at all, it may readily continue to form until the coating is half an inch in radial thickness (one inch diameter). This is the basis upon which the tables given in the former article were worked out. The result is a workable pole line plan which should give satisfactory results. The plan has the indorsement of the best structual engineers of the country.

TABLE IX.

SLEET AND WIND DATA.

| Location of Observing Stations | Max. Wind Vol. 5 Min. Period, Winter Months. | Equivalent Fastest Mile. | Number of Years Recorded. | Number of Storms Reported. | Max. Reported Sleet Deposit on Wires, Radial Thickness. |
|---|---|---|---|---|---|
| Abilene, Tex. | 61 | 81.0 | 28 | 2 | .5″ |
| Albany, N. Y. | 70 | 93.0 | 40 | 29 | .5″ |
| Alpena, Mich. | 56 | 74.5 | 39 | 4 | 1.0″ |
| Birmingham, Ala. | 50 | 66.5 | 14 | 3 | |
| Boston, Mass. | 72 | 95.6 | 5 | 4 | |
| Buffalo, N. Y. | 90 | 120.0 | 20 | 28 | |
| Charleston, S. C. | 67 | 89.0 | 43 | 4 | .3″ |
| Chicago, Ill. | 84 | 112.0 | 23 | 14 | |
| Cincinnati, O. | 48 | 64.0 | 10 | 0 | |
| Cleveland, O. | 72 | 95.6 | 43 | 10 | .5″ |
| Denver, Colo. | 66 | 88.0 | 40 | 4 | |
| Detroit, Mich. | 86 | 114.0 | 22 | 1 | .29″ |
| Dubuque, Iowa | 42 | 56.0 | 39 | 9 | |
| Duluth, Minn. | 71 | 94.5 | 43 | 4 | |
| Fort Smith, Ark. | 66 | 88.0 | 31 | | |
| Galveston, Tex. | 62 | 82.5 | 36 | | |
| Green Bay, Wis. | 55 | 73.2 | 27 | 2 | |
| Havre, Mont. | 72 | 95.6 | 33 | | |
| Kansas City, Mo. | 74 | 98.5 | 25 | 17 | .5″ |
| Knoxville, Tenn. | 84 | 112.0 | 40 | | |
| Los Angeles, Calif. | 48 | 64.0 | 36 | | |
| Memphis, Tenn. | 75 | 100.00 | 40 | 7 | 1.5″ |
| New Orleans, La. | 52 | 69.2 | 40 | | |
| New York City, N. Y. | 96 | 128.0 | 30 | | |
| Norfolk, Va. | 64 | 85.0 | 43 | | |
| North Platte, Neb. | 72 | 95.6 | 39 | 3 | .5″ |
| Omaha, Neb. | 66 | 88.0 | 41 | 4 | |
| Philadelphia, Pa. | 63 | 84.0 | 18 | 5 | |
| Phœnix, Ariz. | 36 | 48.0 | 17 | 1 | |
| Pittsburg, Pa. | 69 | 92.0 | 39 | | |
| Rapid City, S. D. | 66 | 88.0 | 26 | | |
| Roseburg, Ore. | 48 | 64.0 | 36 | 1 | |
| San Francisco, Calif. | 60 | 80.0 | 42 | | |
| Salt Lake City, Utah | 60 | 80.0 | 38 | | |
| Sante Fe, N. M. | 51 | 68.0 | 40 | | |
| Shreveport, La. | 54 | 72.0 | 16 | 1 | .2″ |
| Spokane, Wash. | 48 | 64.0 | 33 | | |
| St. Paul, Minn. | 60 | 80.0 | 22 | | |
| Tampa, Fla. | 49 | 65.4 | 24 | | |
| Washington, D. C. | 60 | 80.0 | 26 | 18 | |
| Wichita, Kan. | 62 | 82.5 | 26 | 3 | |
| Williston, N. D. | 72 | 96.0 | 35 | | |

The highest five-minute period for the winter months is 96 miles, (New York), and the lowest is 36 miles (Phœnix, Ariz.). This indicates a variation too great to permit of an assumption of the same wind velocity for the entire country. Where it is definitely known that no ice does or can occur, the minimum number of poles will be required to properly support the wires without spans that are too long for safety to the wires.

Every twenty-five miles or less of line would seem to be a problem in istelf, due to the different soil conditions, pole timber economically available, wind and ice load and load of wires. For instance a pole line south from Lake Erie is subject to the heaviest wind and ice for some miles from the Lake; it may then enter a sheltered valley free from wind and ice storms of severity; thence enter a prairie country. The soil may be sand at the lake front, clay or rock in the valley and loam in the prairie, which would considerably vary the expense of digging and make necessary the use of as few poles as possible in the rock, even though they were expensive poles, rather than the use of a larger number of cheap poles. It might strictly be said that every mile of line is a separate problem.

## The Way To Keep Up To Date.

William Marshall, assistant manager, Canadian Pacific Railway Telegraphs, Winnipeg, Man., in a recent letter says: "It is needless for me to commend the value of TELEGRAPH AND TELEPHONE AGE to all men employed in the telegraph service. This has been done time and again by the most prominent men in the telegraph world, but I cannot help saying that the AGE, now combining as it does telegraph and telephone features meets a present day want not felt some years ago. Telegraph men in increasing numbers have to keep abreast of telephone development almost as much as with the telegraph, owing to the use companies are making of the telephone in enlarging their facilities. The AGE therefore, dealing in all up-to-date matters concerning both of these branches of communication, is manifestly the best kind of a journal for practical telegraph men to take. I therefore wish yourself and the AGE continued prosperity."

THE GREAT NORTH WESTERN TELEGRAPH COMPANY, in Canada, was organized May 7, 1880. In 1881 this company absorbed the Montreal Telegraph Company.

THE OLD WIRE CHIEF says: "Some fellows know the tricks of the trade, but not the trade."

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# THE MORKRUM PRINTING TELEGRAPH SYSTEM

## FULL DESCRIPTION OF OPERATION

THEORY.

The Morkrum system of printing telegraphy consists of an apparatus for automatically transmitting electrical signals over a wire combined with an apparatus for receiving these and translating them into printed characters.

*Signaling Code.*—A code of signals must be arranged which will give a different combination of signals for each letter and function of the receiving printer. The signaling code employed is what is known as the five unit code.

*Five Unit Code.*—If a given unit of time be divided into five intervals, during each of which either positive or negative current may be transmitted, it is possible to produce thirty-two combinations of five positive and negative intervals.

es successively over the five segments, it will send negative current to the line when passing over a segment whose key has been depressed, and will send positive current to the line when passing over a segment whose key has not been depressed.

*Reception.*—At the receiving end the line wire will be connected to one side of the coil of a polar relay and the other side of the coils will be connected to ground. Thus, when negative current passes over the line and through the coils of the relay, its armature will be moved to one side and when positive current passes over the line, the armature will be moved to the opposite side.

The contact against which the armature is held by negative current passing through the coils of the relay, is known as the marking contact, while

| | UPPER CASE | – ? : $ 3 | & £ 8 | SIGNAL | ( ) | . , | 9 0 1 4 | 5 7 ; 2 / 6 " | SPACE | CARRIAGE RETURN | LINE FEED | LETTER SHIFT | FIGURE SHIFT | BLANK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LOWER CASE | A B C D E F G H | I J | K L M N | O P Q R | S T U V W | X Y Z | | | | | | | |
| 1 | | – – + – – – + + | + – – + + | + + + + | – + – – | – + + – | – – – + | + + – – | + | + | + | – | – | + |
| 2 | | – + – + + + – + | – – – – | + + + – | – – – + | + – – – | + + + + | + – – – | + | + | – | – | – | + |
| 3 | | + + – + + – + – | – + – + | – – + – | + – – + | – + – – | + – – + | – + + + | – | + | + | – | + | + |
| 4 | | + – – – + – – + | + – – + | – – + + | + – – – | + + – + | + – + – | + + + – | + | – | + | – | – | + |
| 5 | | + – + + + + – – | + + + – | – – + – | – – – + | + – + – | – – – – | – + + + | + | + | + | – | – | + |

FIG. 1. POLARITY OF INTERVALS OF FIVE-UNIT CODE.

Figure 1 shows graphically the polarities of the intervals or impulses of each combination of the code. Each vertical row represents the complete unit of time, during each of the five intervals of which the current transmitted may be either positive (+) or negative (—) as shown.

*Transmission.*—A simple means of transmitting a five unit signal over a line would be: A commutator having five segments insulated from each other and a brush attached to a shaft, which with the shaft revolving, would make contact with the five segments successively. Each of the five segments would be connected to the lever of a key and each of these keys would play between two contacts. The contacts against which they normally rest being connected to positive battery and the contacts which they are held against when the keys are depressed being connected to negative battery.

If one or several of these keys are depressed, negative battery will be connected to the corresponding segments of the commutator and as the brush passthe contact against which the armature is held by positive current passing through the relay, is known as the spacing contact.

The marking contact of the polar relay is connected to a brush, which in revolving passes over the five segments of the receiving commutator. Each of these five segments is connected to a magnet, known as a selecting magnet. Thus, it is evident that when the armature of the polar relay which is connected to battery, is resting against its marking contact, this battery will flow to the brush and through whatever segment the brush is resting on at that instant, to the corresponding selecting magnet and energize it.

*Theory of Operation.*—The transmitter brush at one end of the line, and the receiver brush at the other end of the line are made to revolve in such a manner that they will always be on corresponding segments. That is, when the transmitter brush is passing over segment 1 of the transmitting com-

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mutator, the receiver brush is passing over segment 1 of the receiving commutator.

Since the polar relay at the receiving end of the line moves its armature against the marking contact only when negative, or marking battery is passing over the line, it is apparent that when the transmitting brush is on a segment connected to negative battery, the armature of the receiving polar relay will move over against its marking contact and connect battery to the receiver brush. Thus, battery will flow through the segment on which the brush is resting and operate the corresponding selecting magnet.

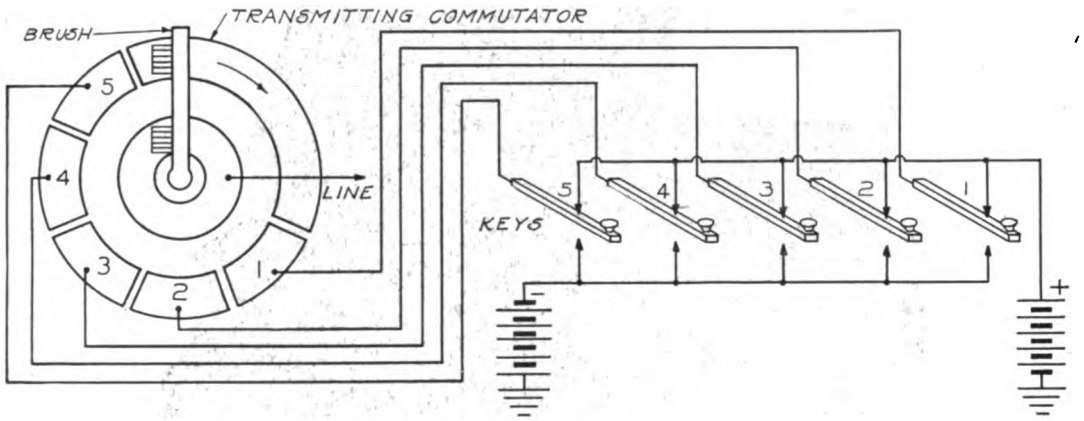


FIG. 2. SIMPLE TRANSMITTING ARRANGEMENT.

Specifically this means that should transmitting key 1 be depressed against its negative contact, it would connect negative battery to segment 1 of the transmitting commutator and thence through the brush to the line. From the line the negative current would pass through the coils of the relay causing its armature to be moved over against the marking contact. Battery would flow from the armature to the brush, which is now passing over the first segment, and from this segment it would flow to the first selecting magnet, operating it.

From the foregoing explanation it is readily seen that the depression of any of the transmitting keys will cause the operation of the corresponding selecting magnet at the receiving station.

In the Morkrum system the five keys are replaced by an automatic transmitter controlled by a perforated tape or ribbon of paper. By means of various combinations of holes in this tape an action corresponding to that of the five keys mentioned

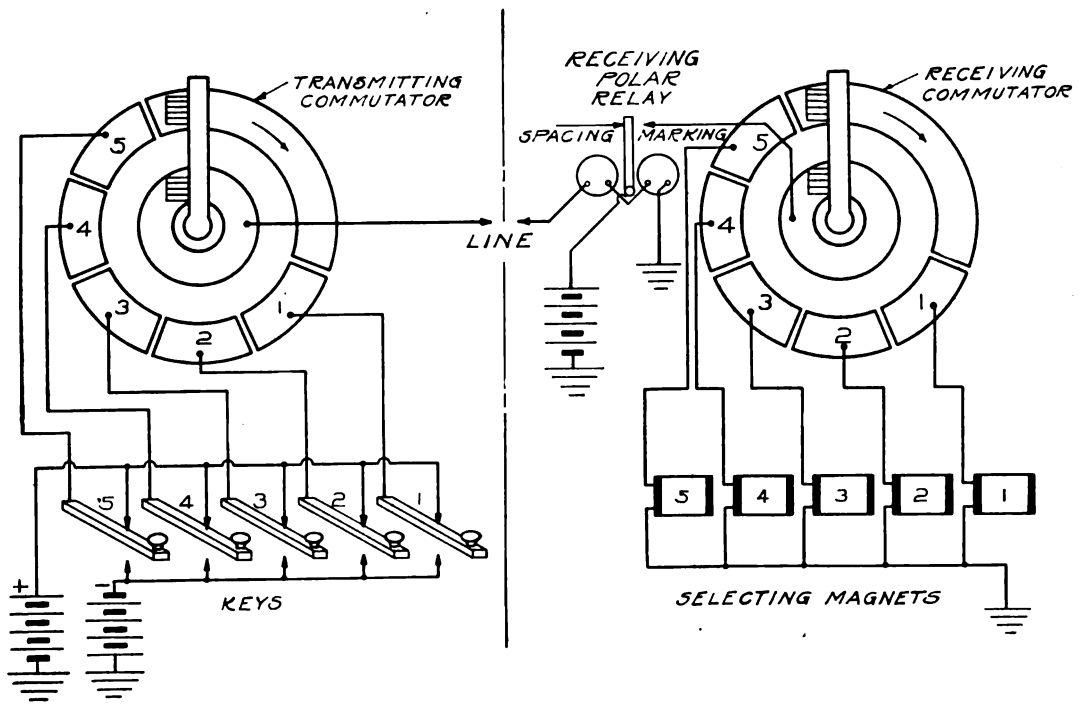


FIG. 3. THEORETICAL TRANSMITTING AND RECEIVING CIRCUITS.

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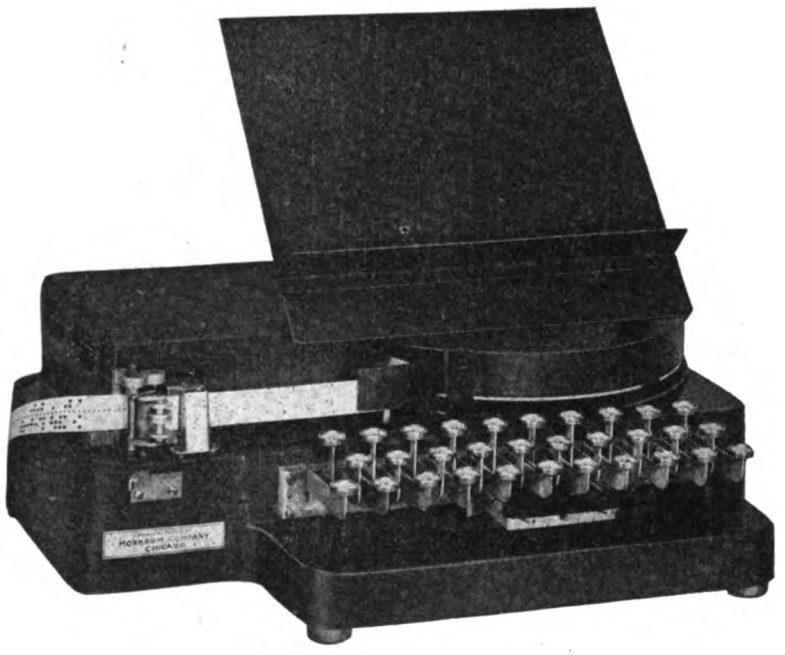

FIG. 4. MORKRUM PERFORATOR.

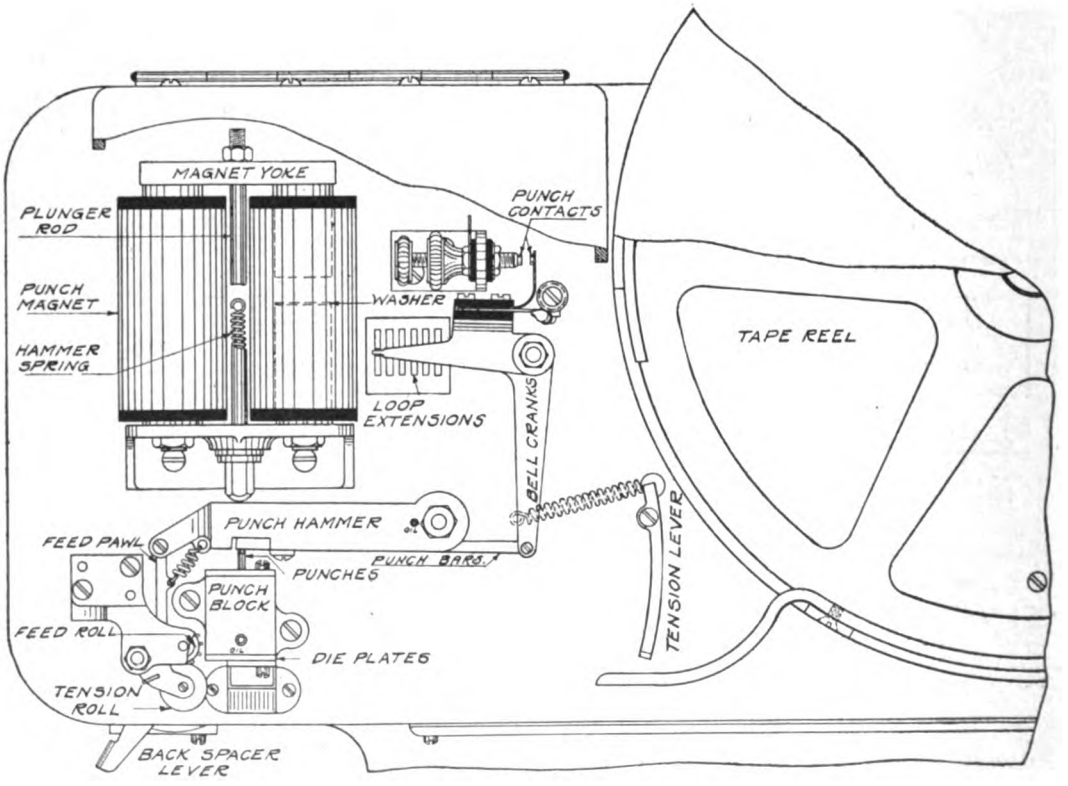


FIG. 5. PERFORATOR PUNCHING MECHANISM.

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above is secured. To prepare this tape a device known as a keyboard perforator is used.

PERFORATOR.

*General Description.*—The keyboard perforator consists of a perforating mechanism controlled by a typewriter keyboard, by means of which combinations of holes corresponding to the signals of the code may be punched in a paper tape.

The essential features of the keyboard perforator are:

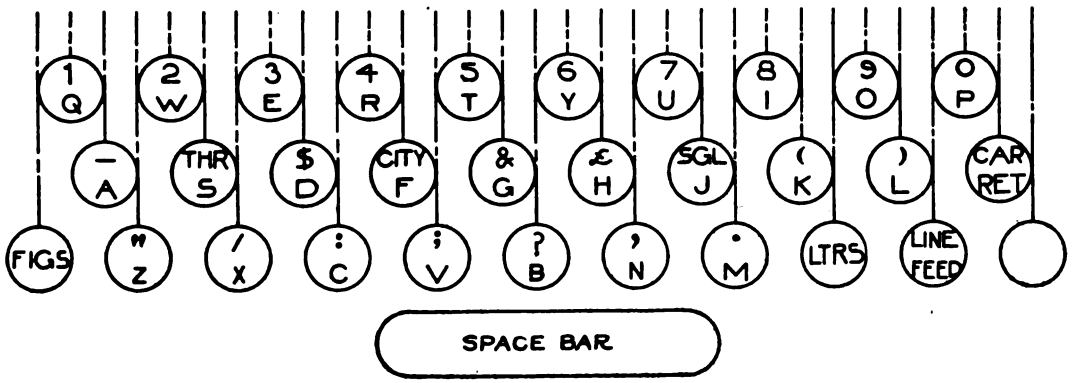


FIG. 6. PERFORATOR KEYBOARD ARRANGEMENT.

1. A punch block containing six punches, between the die plates of which the tape to be perforated passes.

2. A punch hammer operated by a magnet, which forces the punches through the tape.

3. A pawl and feed roll for feeding the tape forward after each combination has been punched.

4. A system of levers whereby the keys of the keyboard determine which punches shall be driven through the paper.

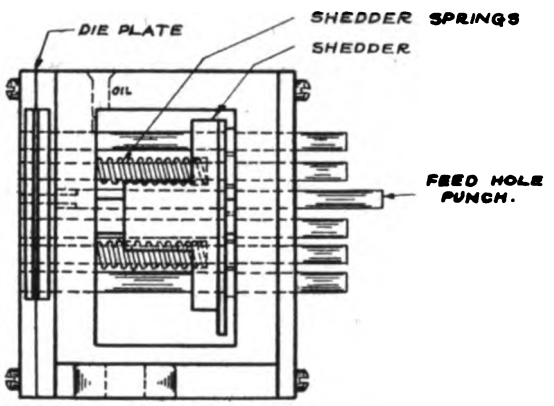


FIG. 7. PUNCH BLOCK.

*Keyboard.*—The arrangement of the perforator keys is similar to that of a typewriter with the exception that when it is desired to write figures or punctuation marks (printed in red on the key tops), the key marked *FIGS* must first be struck. This key must not be held down after being struck, but the operator must remember that the receiving printer will continue to print upper case characters (figures and punctuation marks) until the key marked *LTRS* has been struck, which returns the typing mechanism of the receiving printer to the normal position.

There are thirty-one keys and a space bar on the keyboard. Twenty-six of these are for the letters of the alphabet, one for the figure shift, another for unshifting from figures to letters, and a third (a key at the extreme right of the keyboard with a blank top) used for punching feed holes, and thus feeding the tape forward. This has no effect on the distant printer. The remaining two keys are marked *CAR RET* and *LINE FEED*. The striking of the first causes the carriage of the receiving printer to return to the beginning of the line, and of the second causes the paper to be fed up.

*Punch Mechanism.*—The punch block contains six punches, five of these corresponding to the five units of the code, while the sixth punch is used only to perforate the feed holes in the tape. Should all six punches be driven through the tape by the action of the punch hammer, six holes will be perforated across the tape at right angles to its edge, with the third hole from the top smaller and slightly in advance of the others. (See Figure 8).

The upper hole is numbered "One," and corresponds to the first interval of the code. The next hole below is numbered "Two," and corresponds to the second interval of the code. The third and smaller hole is a feed hole, which is engaged by the teeth of the feed roll, which moves the tape forward after each combination is perforated. The next three holes are known as "Three," "Four" and "Five," and correspond to the last three intervals of the code.

It will be noticed that the feed hole punch is longer as well as smaller than the other five punches. Whenever the punch hammer is operated by the magnet, a button on it strikes this longer punch thus perforating the tape.

Interposed between the punch hammer, and the other five punches are five punch bars (see Figure 10). Should the punch hammer be driven forward when the punch bars are in place, the edges

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of the bars would strike the ends of the five punches, and the punches themselves be driven through the paper.

The five punch bars are connected by bell cranks to five U-shaped bars (known as loops) pivoted at each end, and held by means of springs so that their greatest length is in an approximately horizontal position directly beneath the keyboard.

Attached to the lower edge of the key lever is a piece of metal known as a comb. This comb is cut out in such manner that the depression of the key will cause the comb to strike the top edge of one or several of the loops and depress them. Each letter or function key, of course, has a different comb so that different combinations of loops are operated by the various keys.

The depression of any loop withdraws the corresponding punch bar from in front of its punch so that when the punch hammer is operated by the magnet the corresponding hole is not punched in the tape. Thus if loop 5 only is depressed by the key comb, the space assigned to hole "Five" on the tape will remain intact, all the others being punched, and we will have the signal for letter K (see Code).

In addition to the five loops controlling the five punch bars, there is a sixth or power loop, which is operated by the depression of any key. The downward movement of this loop closes the punch contacts (see Figure 5), energizing the punch magnet, and thus operating the punch hammer.

*Feed Mechanism.*—Spaced at equal intervals around the feed roll are twelve projecting feed pins. which mesh with the small feed holes punched in the tape. On the same shaft, below the feed roll, is fastened a feed ratchet with twelve teeth.

A feed pawl is pivoted to the end of the punch hammer and held against the feed ratchet by a spring. When the punch hammer is moved forward by the punch magnet, the pawl moves forward with it, and engages a tooth of the feed ratchet. When the punch magnet is de-energized, the hammer spring moves the punch hammer back to the normal position and the feed pawl causes

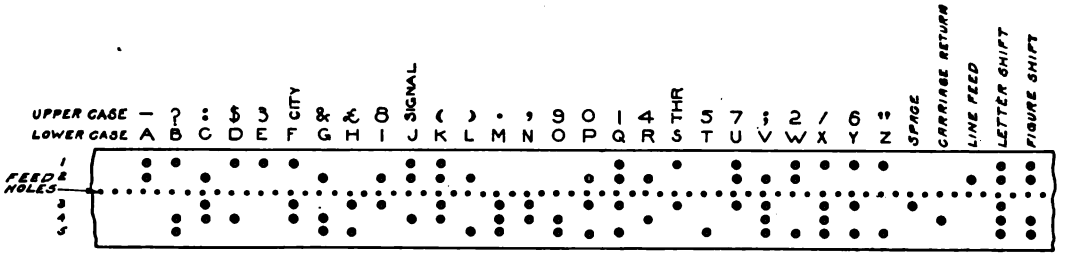


FIG. 8. SPECIMEN OF TAPE WITH ALL CHARACTERS PERFORATED.

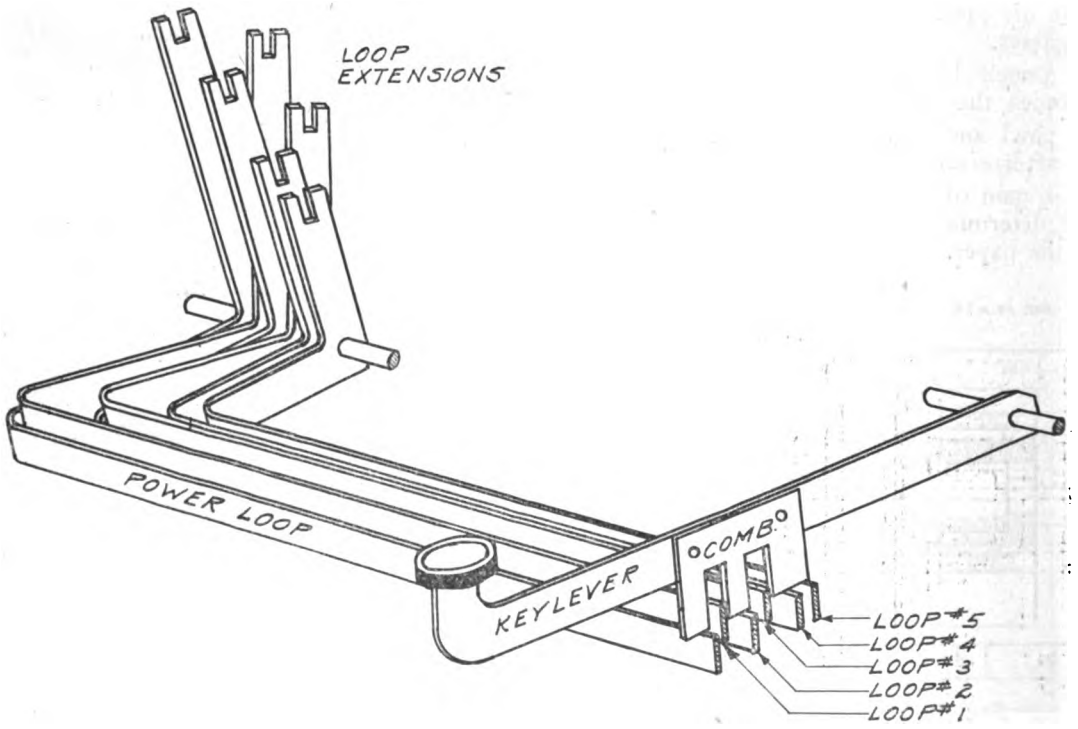


FIG. 9. PERFORATOR LOOPS.

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the feed roll to revolve and move the tape forward one feed hole (one-tenth of an inch).

The travel of the tape for each operation of the punch hammer is accurately limited by a twelve toothed star wheel attached to the lower end of the feed roll shaft with a detent roller held by a strong spring bearing on its teeth.

*Rubout.*—Provision is also made for moving the tape backward for correction of errors.

This device consists of an irregularly shaped lever, which at the early part of its movement engages a pin projecting from the feed pawl, and thus moves the feed pawl out of mesh with the feed ratchet. Further movement of this back spacer lever brings the pivoted back spacer pawl (carried on the back spacer lever) against a tooth of the star wheel, and rotates the feed roll shaft backward one space. When the lever is released the detent roller again engages the star wheel and

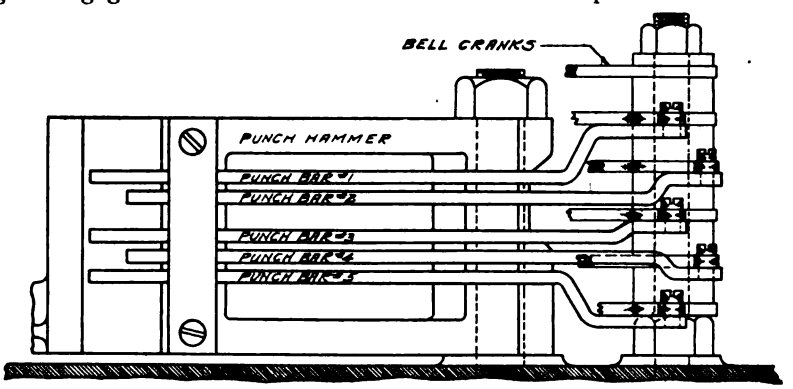


FIG. 10. PUNCH HAMMER AND BARS.

insures proper position of the tape in front of the punches.

Thus the operation of the back spacer lever moves the tape backward, and places the most recently punched set of perforations in front of the punches.

As stated above the back spacer is used for correction of errors. The operation of making a correction, or rubbing out a wrong letter, is as follows:

Immediately after the wrong letter has been perforated, the operator moves the back spacer lever from left to right. This moves the tape back the space of one feed hole, and the combination perforated by the wrong key will be directly in front of the punches of the punch block. The *LTRS* key is now depressed, and all of the punches are forced through the tape.

If the receiving printer is printing letters when the "letters" combination is sent over the line, this signal has no effect upon it and no evidence of the correction or rub-out appears. If the receiving printer is printing upper case characters, or figures, the reception of the "letters" signal will cause the typewheel to return to lower case. For this reason, should the operator strike the wrong key while writing figures or other upper case characters, it will be necessary after the back spacer has been operated and the *LTRS* key depressed to strike the *FIGS* key, before striking the desired key. If the operator neglects to strike the *FIGS* key, the receiving printer, which should then be printing upper case characters, will be printing lower case characters.

It is obvious that if it is desired to rub out several letters, that the back spacer should be operated once for each letter which is to be eliminated, and the *LTRS* key then struck an equal number of times.

*Indicator.*—When the number of characters written reaches sixty-five, seven less than the allowable number on a line in the printer, a small red lamp under the keyboard is lighted by a mechanically operated contact.

The contact is closed by the action of a large gear, known as the indicator gear This gear meshes, through an idler gear mounted on a lever, with a twelve toothed pinion on the feed roll shaft. Thus, whenever the feed roll moves the tape forward one space, the indicator gear moves one tooth.

Mounted on the indicator gear is a pin, A, which, when the gear has moved sixty-five teeth from its initial position, strikes an armature, and presses it against the lamp contact. This will light the lamp, and signal the operator that only seven more characters can be perforated on the line.

The revolving of the indicator gear winds up a watch spring, one end of which is attached to the gear. When the operator depresses the "carriage return" key, the key strikes a bell crank which moves the release rod to the left. This throws the indicator idler gear out of mesh with the feed roll pinion and the indicator gear is quickly returned to its initial position by the watch spring.

Since the length of the depression of the "carriage return" key may not be long enough to allow the gear to get all the way back to its initial position, a notch is cut in the release rod. When this rod is moved to the left a spring actuated pawl (known as the release rod pawl) moves into the notch, and holds the rod in such a position that the indicator idler is held out of mesh. When the indicator gear has almost returned to its initial position a projecting pin B, on the under side of the gear, strikes this pawl and knocks it out of the notch in the rod. This allows the indicator idler gear to again mesh with feed roll pinion.

(*To be continued.*)

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# TELEGRAPH MEN

## AND THE CORPUS CHRISTI STORM

The tropical hurricane which burst over Corpus Christi, Texas, on September 14, creating a tide of ten feet six inches, and accompanied by a tidal-wave which was driven before a seventy-mile gale, caused the death of five hundred persons, left four thousand homeless, and laid waste some twenty million dollars' worth of property.

The town was without drinking water or lights; the railroad on one side of it was washed away, and virtually every dwelling on its beach front was destroyed, together with the boats moored there. Out in the bay were scores of human beings, clinging to spars and wreckage. The Court House had been turned into a morgue.

With the memory of the New Orleans storm of 1915 still fresh in the minds of the members of the Western Union Gulf Division staff, and with the knowledge gained by hard experience during the almost yearly visitations of disastrous storms somewhere in the Gulf Coast country, preparations were made for meeting this new menace and for restoring service as quickly as possible wherever interrupted.

On September 11, H. McCann, division supervisor of lines, accompanied by E. H. Ward, of the New York office (who at the time was in the Gulf Division on a tour of inspection), proceeded to New Orleans. Another party consisting of M. A. Bass, line maintenance supervisor; H. R. Monohan, division equipment supervisor, and L. V. Schunder, district equipment supervisor, also started for what at that time was thought to be the threatened section. The line and equipment forces were mobilized, as far as was practicable, close to the storm center, and emergency equipment was concentrated and held ready for immediate shipment to any desired point.

During Friday and Saturday, the 12th and 13th of September, the indications became stronger that New Orleans was again to be tried by storm, but on Saturday night the hurricane took an abrupt turn to the west.

Sunday morning it was reported that, beyond doubt, it was Galveston that was to receive the brunt of the shock, and the telegraph officials above mentioned made all haste in that direction. Arriving at Houston, Tex., Sunday night, it was found that Galveston had escaped with little damage from high water, but that the coast further to the southwest had received the brunt of the storm.

Corpus Christi, the largest city on the coast south of Galveston, was out of communication, but it was reported that refugees arriving inland were bringing tales of water over head high in the business district and enormous damage to the entire vicinity.

Sufficient data was at hand to insure telegraph men of the necessity for immediate and strenuous [illegible] and the forces were disposed accordingly.

Mr. McCann with his general foreman, A. S. Foote, took charge of the work of repairing the damage at Galveston, as this was the immediate need and the location was satisfactory for the direction of the line forces scattered throughout the affected territory.

Mr. Bass, assembling a large number of men, with the necessary line material, proceeded Monday morning to the scene of greatest damage. The storm had not betrayed the Weather Bureau in its prediction that it would be one of the most severe ever experienced in this country, and the linemen found their task a hard one, as not only were the lines on land badly damaged, but that portion which crossed the bay from the east to the west side had been completely obliterated when the tidal wave which accompanied the hurricane carried with it the railroad trestle and the magnificent causeway which had been the pride of Corpus Christi.

The line forces were detrained at Sinton, the hub of the railroads and lines of communication in that section, and dispatched men north and south to restore service.

As yet no authoritative news had been received from the city, and Messrs. Monahan and Schunder proceeded in that direction. Within a very short distance it was necessary to leave the train, as the railroad where it crosses the Nueces River, eighteen miles from the Nueces Bay into which the river empties, had recieved the full force of the rushing waters, and for about three miles nothing was left but the dump. The tracks and ties were carried off like straws. Fortunately the bridge and trestle at this point were sufficiently strong to permit of walking across, and accompanied by a small force of linemen under Foreman L. Hardy, the party set out in the twilight.

The extent of the damage was apparent at this point, as wreckage from houses from Corpus Christi was piled high on what had been the railroad. Pillows and other articles marked "Corpus Beach Hotel" were found, and several human bodies were seen in the water near the railroad right-of-way. The hotel mentioned was used by the Government as a hospital, and as it was of good substantial construction, it was evident that the storm had hit Corpus Christi hard.

The long walk across the pile of mud, wreckage and seaweed tossed up by the waves was not made easier by the presence of hundreds of snakes of every imaginable variety. Fortunately these were mostly numbed by the cool air and the buffeting they had received and the few that showed any inclination to trouble were dispatched with clubs. There were thousands of cattle stranded on the few dry spots near, and they were so numerous on some parts of the railroad dump that it was necessary for the party to beat a way through.

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Arriving at the next town, Calallen, the party was joined by H. L. Brown of the division traffic office, who had arrived the night before and was stranded, awaiting some means of conveyance to a point that would be within reaching distance of Corpus. Later that evening a work train which had arrived from the south furnished the long sought ride and the whole party arrived at Robstown about eight o'clock, tired, wet and hungry, but still determined on reaching the goal set out for.

At Robstown a long message sent from Corpus Christi by Manager C. J. Heath, by messenger, was found. This message had only been partly sent when the elements intervened, and after several attempts, Harry Brown succeeded in getting in touch with Brownsville down on the Mexican border. Manager Reed, of Brownsville, took the message, and had it sent to San Antonio by wireless through the courtesy of the Army authorities at Fort Brown. This message contained a concise report of the conditions at Corpus, and the story that it told was one of the many similar on record, of telegraph men remaining on the job regardless of their own safety or comfort.

"Bill" Heath, famous in telegraph circles as one of the "first men to use a mill," had lost everything he owned. His home, situated in a beautiful little park only a few hundred feet from the water, had received all of the fury of the wind and water. It, with its contents, was beyond salvage; but "Bill" and Mrs. Heath stayed on the job. He sent out the business until his last wire went down, and by that time the furniture of the office was afloat. Then he dispatched the messenger mentioned above on the last train out.

On Monday night the railroad company sent a train into Corpus, and Brown, Schunder, Monahan, and R. P. Keeney of the line force, went with it.

The town had been placed under martial law immediately, and upon their arrival they were promptly placed under arrest with all other passengers on the train and ordered to remain in the train. Word was gotten to the police authorities, however, and special permission was granted for these four to enter the city.

The trip to the telegraph office is one which none of the party will ever forget. Corpus Christi, famous for its beaches, the mecca of thousands of pleasure seekers from three states, was also the business center for the fertile and wealthy Nueces River Valley. It was a live and booming city, thriving and wealthy, and its citizenry was representative of the great southwest. It boasted a business district of metropolitan character, many fine public buildings, and hotels second to none for a city its size; in fact, one of its hotels is admitted to be the equal of any in the southwest. On this dreary Monday midnight, however, stygian darkness, broken only feebly and infrequently by the lanterns of the sentries; odors of every unpleasant description; slimy mud cast up by the ocean from its bottom; wreckage and debris piled high everywhere; and the silence of the dead, out of which the hoarse challenges of the guards came with an abruptness that chilled.

Arriving at the Western Union office, lanterns were procured from the military. The office was indeed a wreck. Several inches of mud and crude oil, the latter tossed in by the water from the oil barges and tanks in the bay, covered the floor. All instruments, motorgenerators and furniture soaked and muddy from the tidal wave, which in its initial rush reached the height of eight feet and later settled to about four feet in the office, at which depth it remained until its final return to the gulf.

The four men stripped, and all night was spent in shoveling out the mud, scrubbing the floor and cleaning the operating table and counter in order that they could be used the next day, if possible, to communicate with the outside world.

Daylight, more welcome than those not in such a position can realize, found the efforts rewarded with a semblance of order. The instruments which had been carried through all the dreary tramping of the day before, and which had been jealously guarded throughout the night, were installed, and the counter and other furniture repaired and set ready for business. Eleven o'clock Tuesday morning, forty-eight hours after the full force of the flood had hit, found the telegraph service re-established, crippled somewhat, it is true, but ready for service.

Manager Heath and his force were on the job early, and the public was admitted at noon. From that time until Thursday morning, sleep and rest were forgotten by the entire force. Food was obtainable only in the form of sandwiches and coffee distributed by women of the city and by the Red Cross. Brown, with the two operators regularly assigned to the office, Cooper and McCrory, assisted by Heath and his wife, did the operating, Monahan, Schunder and Keeney, having done all that was possible for the present, in their plant duties, were drafted into service in attending to the public, most of whom were so unstrung from their experiences and losses that it was necessary to write their messages for them, and to handle them with tact and kindness not usually demanded in business intercourse.

In the meantime, the line forces, after having restored sufficient service by the auxiliary route to permit of giving Corpus contact with the world once more, concentrated their energies on the carrying in of wires over the regular route.

Division Plant Superintendent Hilbert was on the scene early, and having accomplished all that was possible at Galveston, McCann and Foote made their way to what had developed into a battle with the elements on one side and the forces of the telegraph service on the other.

Thursday saw their efforts crowned with success, and two wires were brought across the still turbulent waters—across three miles of storm-swept beach and into the office. These were followed Friday by two more wires and the work was carried on until temporary service had been established throughout.

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## South American Telegraph Notes.

BOLIVIA.—Six new lines are to be added to the telegraph system; four of these are now under construction. A wireless telegraph station has been installed at Cobija to put the northeast in communication with other parts of the Republic and with offices in Brazil. The wireless service has been divided into three zones with central stations at Riberalta, Viacha, and Yacuiba.

COLOMBIA.—The council of ministers has just approved terms of a contract for the installation of a radio telegraph station in Puerto Velillo, or some other suitable point along the coast, the station to be of sufficient power to maintain communication day and night with the international station to be installed at Bogota by the Marconi Wireless Telegraph Company. The company is also to install a station in one of the islands of the archipelago of San Andres and Providencia. The city government of Cartagena has approved the contract for the installation of a modern telephone system in the city. In July direct telephone service was established between Bogota and the port of La Donada.

The Central & South American Cable Co. has signed a contract with the Colombian Government, covering a term of twenty-one years, providing for the establishment of a cable service between Colon and Cartagena, Colombia. A special agreement has been made with the Colombian Government covering the collection of tolls. It is expected that the preliminary work leading to the establishment of this new service will be begun within the next few months.

Last March the Marconi Wireless Telegraph Co. Ltd., signed a contract with the Colombian Government for the construction and operation of a wireless station at Bogota. In June a similar contract was signed providing for the construction and operation of a wireless station at or near Barranquilla. Both contracts provide for the inauguration of service within two years.

PERU.—A company with a large capital has been formed in Lima to establish a long distance telephone system throughout the country.

To begin the service as early as possible, the company has decided to commence the construction of the lines from several different points in the Republic at the same time. When these trunk lines are completed other lines will be extended to the north to Piura and Cajamarca; to the south to Arequipa, Cuzco, and Puno; and to the interior to Cerro de Pasco, Jauja, and Huancayo, thus crossing almost all of the Republic. The new company will connect with all the other telephone lines now operating in the country, enabling its subscribers to communicate with persons on the old telephone lines. The work of installing the new system will be under the direction of an American engineer, an expert in telephone installation.

PANAMA.—The President has approved a decision of the general management of the mails and telegraphs, to divide the territory of the Republic into six sections to improve the telegraph service, and designating the central telegraph and telephone offices in each section.

URUGUAY.—The Central and South American Telegraph Company has obtained from the Uruguayan government a concession to bring into the city of Montevideo cable telegraph lines from Rio de Janeiro and from Santos, or from either one of these cities. The company had previously obtained a concession to construct a line between Montevideo and Buenos Aires.

## "Mathematics for Engineers."

"Mathematics for Engineers" is the title of a work by W. N. Rose, which embraces all of the mathematics needed by engineers in practice and by students in all branches of engineering science. The work is in two volumes; the first carrying the studies through algebra, plane trigonometry, mensuration and graphs, the work being carefully graded from an elementary to an advanced stage. The second volume is devoted to the calculus and its applications, harmonics and vector analysis, spherical trigonometry, etc. Volume I contains 507 pages and is an excellent book for the telegraph and telephone engineer or student to possess, as the treatment of the subject of mathematics here worked out is from the engineer's standpoint.

The price of each volume is $6.00 and copies may be procured from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

## "The Night Operator."

Telegraphers who enjoyed reading "The Wire Devils" will welcome this new book by Frank L. Packard. The book contains a number of short stories written about the alluring game of railroading; the first story, "The Night Operator", is also the title of the book.

In "The Night Operator" you will follow with spell-bound interest a panorama of rushing mountain rivers and dangerous curves, of brave men responsible for the safety of others, who meet their obligation with high hearts and abounding courage.

And when the book is read you will recall with delight "Toodles," the spunky little night operator, "Royal Carlton," the big superintendent, "Regan," the purposeful master mechanic, and "Timmy O'Toole," the valorous Irishman, and say to yourself, "Packard has done it again; written another breathless adventure story; I hope he goes on writing them."

The price of the book is $1.50 net. For sale by TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

PROFESSOR TROWBRIDGE, in the year 1880, proved that signaling could be carried on over a distance of one and one-half miles by electric conduction through the earth.

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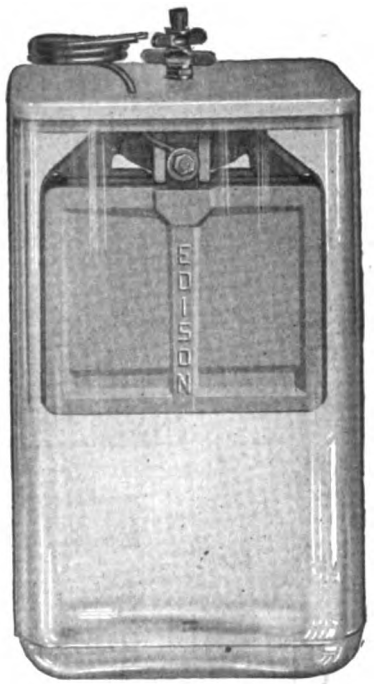


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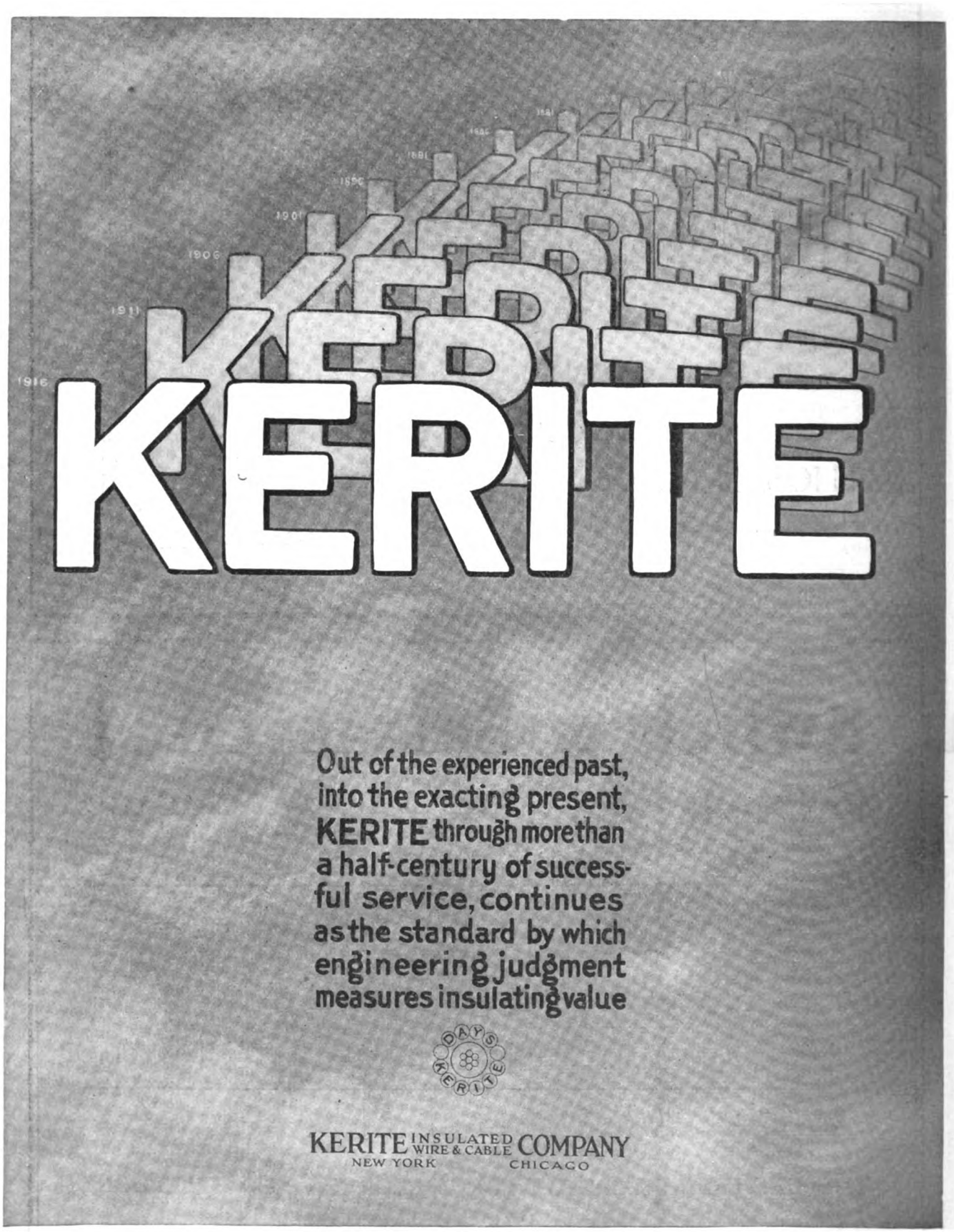


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# THE RAILROAD
## TELEGRAPH AND TELEPHONE

### Telegraph and Telephone Division.

AMERICAN RAILROAD ASSOCIATION.

The Committee of Direction held an executive meeting in New York, October 15, 16, and 17. At this meeting Chairman M. H. Clapp tendered his resignation, J. F. Caskey, first vice-chairman being elected to fill the vacancy. H. Hulatt, second vice-chairman was elected first vice-chairman and W. H. Hall was elected second vice-chairman to succeed Mr. Hulatt. E. L. King was appointed a member of the committee of direction succeeding W. H. Hall, elected second vice-chairman of the Section. P. F. Frenzer was appointed a member of the committee on nominations, succeeding W. H. Hall. G. A. Cellar was appointed chairman of committee 1, construction and maintenance, outside plant, vice M. H. Clapp. E. C. Keenan was appointed chairman of sub-committee A, of committee number 1, vice G. A. Cellar. H. A. Shepard was appointed chairman of sub-committee B, of committee number 1, vice E. C. Keenan. I. C. Forshee was appointed chariman of committee number 4, vice J. F. Caskey.

These official changes were approved by the Committee of Direction on October 16; Mr. King's appointment to be submitted to the Division at the December meeting in Chicago, for approval.

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COMMITTEE No. 2, construction and maintenance of inside plant, held a meeting at Cleveland, September 29 and 30, to consider reports of the various subcommittees and to determine the character of the report to be made to the Telegraph and Telephone Division at the December convention to be held in Chicago. At this meeting were present: R. F. Finley, chairman; J. H. Brennan, superintendent of telegraph, St. Louis and San Francisco Railroad; A. W. Douglas, assistant superintendent of telegraph, Chicago, Rock Island and Pacific Railroad; H. W. Drake, apparatus engineer, Western Union Telegraph Company; I. C. Forshee, electrical engineer, Pennsylvania Railroad, Eastern Lines; and G. K. Heyer, railway sales engineer, Western Electric Company, New York; Thomas Rodger, superintendent of telegraph, Grand Trunk Railway, Montreal, Que.; A. Behner, telegraph and telephone engineer, New York Central Railroad; Worth Rogers, telegraph and telephone engineer, Southwestern Region, United States Railroad Administration, St. Louis, Mo.; G. R. Stewart, general wire chief, Illinois Central Railroad, Chicago; W. S. Wood, division supervisor of equipment, Western Union Telegraph Company, Chicago; C. A. Worst, superintendent of telegraph, Chicago, Burlington and Quincy Railroad; C. H. Williamson, telegraph and telephone engineer, St. Louis and San Francisco Railroad; C. H. Martin, general wire chief, Chicago, Burlington and Quincy Railroad, Chicago; and M. H. Clapp, chairman, Telegraph and Telephone Division, American Railroad Association, Washington, D. C.

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E. W. MASON, formerly superintendent of telegraph, has been appointed general manager of the Western Pacific Railroad, effective September 1. During the war Mr. Mason served as lieutenant colonel of engineers in France.

J. P. QUIGLEY has been appointed superintendent of transportation and telegraph of the Western Pacific Railroad, with headquarters at San Francisco.

E. R. FISHER, recently assistant superintendent of telegraph, Missouri, Kansas and Texas Railroad, has accepted a position with the Northern Pacific Railroad at Spokane, Wash.

ANDREW STONEBERG, lieutenant in the Railroad Corps operating in Siberia, died recently in the hospital at Krasnayarsk, after a three days' illness. Death was due to quinsy. Prior to enlistment in military service Mr. Stoneberg was for ten years in the telegraph construction service of the Northern Pacific Railroad—during recent years as gang foreman. The remains are being transported to this country for burial. Interment will be at Stanchfield, Minn., about November 20.


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### Southern Pacific Railroad.

E. L. KING, superintendent of telegraph, Southern Pacific Railroad, San Francisco, Calif., reports the following staff changes effective October 1:

W. R. BIRT, appointed telegraph inspector and revaluation engineer with jurisdiction extending over Southern Pacific lines south of Ashland, Arizona Eastern Railroad.

A. THOMPSON, who has returned from military service in France, assumes his former position of telephone inspector and lines supervisor, Northern District, vice R. E. Stephenson, assigned to other duties.

F. W. Carr, in charge of telephone maintenance and repair work at San Francisco, vice S. A. Nixon.

S. H. NELSON, formerly located at Hanford, has assumed charge of the Oakland Pier District, vice F. W. Carr.

J. N. EVANS has been appointed division lineman at Tehachapi, vice E. M. Laird, resigned.

A. L. BRANT has assumed charge of the Hanford district, with headquarters at Goshen Junction, vice S. H. Nelson.

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W. B. WAY, wire chief, Canadian Pacific Railway Company's Telegraph, Moose Jaw, Sask., is the inventor of a direct point single line telegraph repeater which promises to be a satisfactory system. Mr. Way is an old-timer on the C. P. R., having been agent and operator at Griswold, Man., as far back as 1896.

W. J. SERVIS, assistant wire chief at Dickinson, N. D., Northern Pacific Railroad, is away on a two months' leave of absence. He is being relieved by B. C. Littlefield of the Missoula, Mont., office. Mr. Servis will visit various points in the south, and will be in Watertown, Fla., for the golden wedding anniversary of his father and mother, who reside in that city.

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### Important Articles Which Have Appeared in "Telegraph and Telephone Age"; Many of Them Thoroughly Illustrated With Diagrams.

The Undulator, By J. H. Bell, January 1, 1919
The Railways of Great Britain, By T. P. McBey, January 1, 1919
The Buzzer as a Telegraph Receiving Instrument, By H. A. Emmons, January 16, 1919
Multiplex Telephony and Telegraphy, By F. B. Jewett, January 16, 1919
Signal Corps Development of Vacuum Bulbs for Radio Signaling, February 1, 1919
Approved Interior Wiring Methods, By J. H. Mayer, February 16, 1919
Telegraphy as a Handicraft, February 16, 1919
With the Morse Operators in France, March 1, 1919
The Audion Amplifier, By Lee de Forest, March 1 1919
A Radio Remote Control used in France, By S. W. Beach, March 16, 1919
Placing of House Cables in Large Buildings in New York City, April 1, 1919
The Dixon Ocean Cable Amplifier, April 1, 1919
Radio Reception Through Static and Other Interference, By R. A. Weagant, April 1, 1919
Piezo Electricity, April 16, 1919
Artificial Light in Telegraph Offices, By J. H. Mayer, April 16, 1919
What Is Electricity, By W. H. Jones, April 16, 1919
With the Army of Occupation in Germany, April 16, 1919
Transoceanic Radio Communication, The Barrage Receiver, By E. F. W. Alexanderson, May 1, 1919
The Private Automatic Telephone Exchange, By J. H. Finley, May 1, 1919
Simultaneous Telegraphy and Telephony, Composite Apparatus, May 1, 1919
Seventy-Fifth Anniversary of the Telegraph, May 16, 1919
Telegraph Systems of the Oil Pipe Lines, May 16, 1919
Vacuum Lightning Arresters for Signal Lines, May 16, 1919
Ocean Cable Receiving Instruments, June 1, 1919
Telephone Receivers in Radio Signaling, June 1, 1919
New Alternating Current Relay, June 1, 1919
Cable Censorship During the War, June 16, 1919
Signal Corps Operations in France, June 16, 1919
Some War-Time Contributions to Scientific Advancement, June 16, 1919
Radio Transmitting Sets on the NC Type Seaplanes. July 1, 1919
A New Type of Circuit Fuse, The Thermal Fuse, July 1, 1919
Universal Duplex Apparatus in Use by Western Union Telegraph Co., July 16, 1919
Radio Transmitter for Seaplanes, July 16, 1919
High Frequency Signals Over Telegraph Wires, August 1, 1919
Legal Status of Audion Inventions, August 1, 1919
American Printing Telegraph Systems in France, August 16, 1919
Determining Harmonic Causing Telephone Interference, August 16, 1919
Fast Morse Operators of To-day in the Service of the Western Union, August 16, 1919
Experience of Military Telegraphers During the Civil War, August 16, 1919

The price is 15 cents per number; back issues three or more months old, 25 cents each.

Telegraph and Telephone Age
253 Broadway, New York.

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# INDUSTRIAL

### G. K. Heyer.

The subject of this sketch, Mr. G. K. Heyer, is assistant telephone sales manager of the western Electric Company, New York, and is one of the most widely known telephone men in the United States.

Mr. Heyer was born at Colts Neck, N. J., September 20, 1880, and at eighteen years of age was graduated from the Freehold, N. J., high school, later taking the four years' course at Rutgers College, graduating in 1902 with the degree of Bachelor of Science.

In 1902 he entered the service of the Western Electric Company, taking the student's training course after which until 1908, he worked in various departments gaining information and knowledge of all phases of the telephone business.

In the latter part of 1908 he took up the work of applying the telephone and selector to railroads for handling the movement of trains. This work is more generally known as train dispatching by telephone. In June, 1910, Mr. Heyer was made railway sales manager of the Western Electric Company in charge of railway sales for all of the United States. From 1910 to 1918 Mr. Heyer aided materially in the development of the company's complete line of railway telephone equipment, which is now in use on all of the leading railroads in the United States, as well as on those in many foreign countries. During the war Mr. Heyer assisted the Railway Administration at Washington in selecting the equipment for use on the American railway system in France, and was instrumental in selecting the personnel for the overseas railway battalion. In February, 1919, Mr. Heyer was made assistant telephone sales manager of the company.

### Material Purchased by Brazilian Telegrah System.

The Bureau of Foreign and Domestic Commerce has received from the administrative office of the government telegraph service of Brazil a list of the materials purchased by that office, together with the prices which were paid before the war. Duplicates of this list may be obtained by interested American firms on application to the Bureau or its district and co-operative offices. Refer to file No. 9905.

### Fault Location with Exploring Coil.

Various combinations of induction coil, primary battery, telephone receiver, vibrator and telephone receiver have been used during the past fifteen years for the purpose of locating crosses, grounds and leaks in cabled conductors. Much experimental work has been done in developing a satisfactory exploring coil to move along the surface of the cable and several types of coil have been placed on the market. The Matthews Woodpecker exploring coil, used in connection with the Matthews' Telefault testing unit, is a highly efficient detector, and is meeting with wide use in telegraph and telephone service.

THE WIDE USE of Electrose insulating products has been one of the outstanding features of radio telegraph apparatus development. The insulation units manufactured by the Electrose Company had already found wide application in land line telegraph and telephone engineering, and the extension into the radio field was a natural development.

THE HIGH GRADE RUBBER COVERED WIRE manufactured by the New York Insulated Wire Company is widely used in telegraph and telephone service. The company reports growing sales to railroad telegraph and telephone departments.

THE SCARCITY OF mica for electrical insulating purposes created a serious situation during the first months of our participation in the late war. American supply houses dealing in mica have succeeded in obtaining adequate quantities of a high grade of mica for commercial requirements now prospective. The Ford Mica Company, No. 14 Christopher Street, New York is in a position to furnish mica in all forms.

THE FRENCH BATTERY COMPANY, of Madison, Wis., is meeting with gratifying success in supplying a high grade of dry cell battery for railroad telephone, selector, and telegraph services.

THE FRANK B. COOK COMPANY, Chicago, Ill., of which George R. Folds is president, has changed the name of the company to the Cook Electric Company. The company manufactures telephone protective apparatus and line construction specialties.

### Book Costs Advance.

The publishers of the following books advise us that, beginning November 1, the prices will be advanced as follows:

"American Telegraph Practice." by McNicol, new price $5.00 per copy.

"Principles of Radiotelegraphy," by Jansky, new price $2.50 per copy.

"Handbook of Mathematics," by Claudel, new price $4.00 per copy.

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# QUESTIONS AND ANSWERS

### Origin of the Word "Telegram."

M. A. F.—It has been stated that the word "telegram" was first suggested by Judge Brown, a patron of the telegraph, at Ogdensburg, N. Y., in the year 1850, six years after the telegraph was introduced. Prior to that date it was customary to employ the words "message," "despatch," or "telegraph," where now the word telegram is used.

### Pocket Sounder.

MILTON J.—A serviceable pocket telegraph set may be purchased for $10.00. This set is made up in watch-case style, has a main-line sounder wound to 150 ohms, and a sending key.

### Galena Crystals.

W. P. E.—No, galena is not an element. It is composed of lead and sulphur. All crystals are not suitable as detectors of radio signals. It often happens that but two or three good galena crystals are found in a pound of the material as purchased.

### Electrical Resistance of Air.

W. N. V.—Compressed air has a higher electrical resistance than air at ordinary pressure, or density.

### The Signal "30."

H. A. R.—Originally, the symbol "30" signified "charges collect"; and as press specials were invariably sent with the tolls to be collected at the receiving end, the signal "30" appeared on practically all telegraph dispatches of this kind. The fact that this symbol appeared at the tail end of so many telegraph communications in course of time gave to it the significance of "finis" or "no more," and as such it has passed into universal use.

### Telegram Around The World.

A. K. K.—Several years ago a test was made to determine the time required to transmit a message by telegraph and cable around the world. The message was started from New York City, passing over the lines of the Postal Telegraph-Cable Company, and the Commercial Cable Company across the Pacific, the time consumed in circling the globe being twelve minutes.

### British "YQ" System.

G. H. F.—We are not sufficiently familiar with present telegraph practice in England to answer your first question, but in regard to the YQ system it may be said that in Great Britain press reports by telegraph are transmitted to the various towns by what is termed the YQ arrangement. Literally, the signal signifies "all copy." In the news-gathering center report is made up to include a certain amount of matter, or number of words, and this report is telegraphed to a number of towns simultaneously. The towns or cities taking a report of given extent may be scattered over a wide area; but the YQ system provides that all of these towns be grouped on one telegraph circuit so that all may copy at the same time. A longer report is YQ'd to another group of towns, and a shorter report may be YQ'd to another group of towns.

### Any One May Ask Questions.

A. A. L.—No, it is not necessary to be a regular subscriber to TELEGRAPH AND TELEPHONE AGE in order to ask questions requiring answers in this department or by mail. We are glad to answer questions from occasional readers as well as from subscribers.

### The "Bug" in Radio Work.

C. M. D.—We are glad to know that you are not one of the kind of senders referred to in our editorial in the October 16 issue. Your remarks on the subject are interesting, and we believe a very great improvement could be made in the sending of radio operators if the boys would understand that *good* sending is simply plain, readable transmission without combinations. We, too, have noticed the combinations made by an operator in one of the big radio stations near New York. His q's generally are sent plainly "ma," and when he makes an r (dot-dash-dot), it sounds too much like en. Some evening in the near future we may gather twenty-five or thirty radio operators in the office of TELEGRAPH AND TELEPHONE AGE and hold a "good sending" contest, awarding prizes to the two or three most perfect senders.

### Telegraph Story Books.

W. P. V.—The books which contain the best stories having the telegraph and the adventures of telegraphers as the subjects are: "Sketches Old and New," by Walter P. Phillips; "Lightning Flashes and Electric Dashes," by W. J. Johnson. "The Wire Devils," by Frank L. Packard, and "The Night Operator," by the same author. Any of these books may be procured from TELEGRAPH AND TELEPHONE AGE.

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# Electro-Physics for the Telegraph, Telephone and Radio Student

No. 16.

## Telephone Transmission.

ATTENUATION COEFFICIENT.

Another term encountered in telephone engineering is attenuation coefficient, which is the ratio of the amplitude of a single cycle of alternating current at the receiving end to that of the same cycle at the sending end. Attenuation coefficients with values from .05 to .01 permit of satisfactory telephone conversation, but values below these figures render conversation difficult.

TRANSMISSION LOSSES.

In Lesson No. 14 (October 1 issue) it was stated that satisfactory transmission is possiblbe where ten per cent of the transmitted current reaches the receiver at the distant end of the telephone circuit, and we have already explained briefly the effects of distortion and attenuation of the transmitted current waves due to resistance, leakance, inductance and capacity. Where wires carried openly on cross-arms are concerned, there is also the factor of interference resulting from induced currents from wires on neighboring pole lines.

Reviewing the various factors which have so far been referred to, it may be pointed out that resistance may be reduced by increasing the size of the conducting wire; or, if iron wire is used, by substituting copper wire. Increasing the size of the wire, however, also increases the capacity, so that when this is done the efficiency is not directly improved. Copper of a given resistance is smaller than iron wire of the same resistance; and, being smaller, has a lower capacity per unit length. Capacity may be reduced by spacing the wires farther apart on cross-arms; but, commercially, spacings of 10 inches or 12 inches are standard and it is not customary to attempt improvement in that direction. In modern long distance telephone engineering *loading* is resorted to to neutralize the effects of capacity, and in a later lesson of this series we shall take up the question of loading, explaining how loading coil values are determined and how the coils are connected in circuit.

Leakage can be reduced by improving the insulation of the individual conductors on a pole line. Obvious steps in improving the insulation are to keep the wires free from contact with leaves or limbs of trees, and to employ a good grade of insulator of a size as large as is practicable. The lower the resistance of the conductor between terminals, the more important it is to maintain a high degree of insulation.

There are various standards of insulation resistance for telephone circuits, but in practice it is understood that where the insulation resistance does not fall below two megohms per mile the transmission efficiency is not seriously reduced. Standard transmission equivalents are based on an insulation resistance of thirty-two megohms per mile.

Inductance, when evenly distributed along a line has, within certain limits, a beneficial effect upon transmission, as the presence of inductance neutralizes the deleterious effects of capacity. One of the reasons why it is possible to talk farther over open wires on pole lines than through cabled conductors, is that the capacity per unit length is lower and that the degree of capacity present is in part neutralized by the inductance, even though the latter is of low value.

Induced disturbances from other circuits—interference—may be nullified by transposing the individual wires in a predetermined manner: that is, transposing the position of the wires relatively to each other, the transpositions being made at insulator supports. Any extraneous current flowing in a telephone circuit which reaches the telephone receivers produces an effect which renders more difficult the reception of the transmitted voice currents over that circuit. Even a small induced current may cause a transmission loss equal to the loss in several miles of cable.


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# CURRENT EVENTS

## EXECUTIVE OFFICE ANNOUNCEMENTS, PERSONAL MENTION, APPOINTMENTS

### WESTERN UNION TELEGRAPH COMPANY.

MESSRS. NEWCOMB CARLTON, president, and Vice-Presidents J. C. Willever, W. N. Fashbaugh and G. M. Yorke, made a three days' inspection trip October 23-25, taking in Philadelphia, Baltimore, Harrisburg, Scranton and Reading.

GEORGE K. HUNTINGTON, assistant auditor, has been appointed acting treasurer of the company, effective November 1.

LEWIS DRESDNER, treasurer, upon his own request, retires from the service, effective April 14, 1920, and has been granted leave of absence dating from November 1 and until his retirement is approved. Mr. Dresdner has been identified with the treasurer's office since March 26, 1882. In January, 1909, he was appointed assistant treasurer, and in May, 1915, was advanced to the position of treasurer, continuing in that office until the present time. At a meeting of the Executive Committee of the company, held October 21, the following resolution with reference to Mr. Dresdner's retirement, was unanimously passed: "The Executive Committee receive with regret intimation of the retirement of Mr. Lewis Dresdner, treasurer. Mr. Dresdner entered the service of the Western Union Company in July, 1873, as messenger boy, and rose to his present important post through his ability, integrity, and high devotion to the company's interests. The committee feel that they cannot too strongly express their appreciation of Mr. Dresdner's sterling qualities and worth and of his long years of unselfish service. He carries with him in his retirement the lasting regard of the committee and of his associates, and all good wishes for long life and happiness."

E. R. SHUTE, assistant traffic engineer, in Vice-President Fashbaugh's office, left New York recently on a trip which will include stops at Detroit, Chicago, Omaha, Kansas City, Dallas, New Orleans and other large terminal offices.

L. E. GALLAGHER, chief operator, Wheeling, W. Va., has returned from military service. He was furloughed on May 22, 1918, to engage in the National service.

W. P. SMITH, of the testing and regulating staff, Mobile, Ala., has been appointed acting chief operator at Columbus, Ga., during the illness of chief operator H. L. Abbott.

WILLIAM C. HAIR, assistant chief operator, has been advanced to the position of night chief operator at Atlanta, Ga., vice R. B. Guinn, transferred.

R. E. LONG, late night chief operator at Seattle, Wash., has been transferred to Grants Pass, Ore.

BEGINNING JANUARY 1, 1920, all employees of the company who have been in the service of the company one year or longer will receive a fifteen per cent increase in salary. Those in service six months, and less than one year will receive a ten per cent increase. On November 1, employees will receive a bonus of thirty per cent of their salaries for the months of August, September and October. On January 1, next, another bonus will be paid amounting to twenty per cent of November and December salaries. The increase will apply to about 32,000 employees and will mean an increase of about $5,500,000 in the annual expense of the company.

### Western Union Lake Division

ELMER C. LAY, formerly connected with the commercial staff at Milwaukee was, on September 11, appointed commercial agent at Columbus, Ohio.

B. F. TRAVIS is city superintendent at Milwaukee, his duties as manager having been assumed by Carl Congdon, recently manager at Springfield, Ill.

L. R. SCHOLL has been appointed city superintendent at Cincinnati, Ohio, his place as manager being filled by the promotion of H. C. Comstock, assistant manager.

BILL HURN, commercial agent at Cincinnati, recently resumed duty after having served twenty-three months in the United States Army. Mr. Hurn's participation in the battles in France was close enough to suit any ambitious fighter. On one occasion he miraculously escaped death when most of the members of his platoon were shot down about him.

AS RED GLOVER, the messenger boy, would say: "The World Serious" is over, and Cincinnati is recovering gradually. The Reds won the title. To telegraph people the important thing about the championship series of games is the way the press

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matter was handled. The Western Union Company had forty-four operators stationed at the Park to speed the news to the four corners of the earth. There were about 400 newspaper men present, and it seemed that each one desired a special loop for himself. City Superintendent L. R. Scholl and his capable staff maintained their reputations by giving a grade of instantaneous service that no one could find fault with. In the four days' play one and one-quarter million words of press matter were dispatched. On the first day, Wednesday, 492,000 words were transmitted. The Plant department came in for no end of praise for the manner in which its representatives provided the wire and office facilities to handle the big rush.

HUGO GEDDE, operator at Kenosha, Wis., recently while en route from the Whitney ship-building plant to the office, was held up and robbed by two highwaymen. The robbers took all of the money on Mr. Gedde's person, amounting to $11.10, but so that he could not say he had been "cleaned out," the gentlemen returned to him ten cents for car fare.

ARTHUR F. OLSEN, assistant manager at Racine, Wis., was on September 30 married to Miss Eva D. Hansen.

ARNOLD H. STIRDAVENT, manager at Geneseo, Ill., after an operation for appendicitis, died at the Hammond hospital and was buried on September 22 at Sheboygan, Wis., his home town. Mr. Stirdavent was a successful office manager and was one of the most promising employees of the district.

C. O. KUHNS, formerly district commercial manager, and later manager at Rockford, Ill., during the period of the war, has resumed his field duties, covering the southern portion of the State of Illinois, E. F. Walsh, formerly of the Green Bay, Wis., office has been transferred to Rockford, relieving Mr. Kuhns.

C. C. SALB, for some time past office manager at Milwaukee, Wis., has been promoted to the field force, where his wide acquaintance with the business men of Milwaukee will make him particularly valuable.

HAROLD MCCANN AND ELMER WOOD, messengers at Milwaukee, have won places on the Y. M. C. A., swimming team. The swimming tank in connection with the Milwaukee office has been very popular with the telegraph employees, both summer and winter. This form of recreation provided by the company is much appreciated by members of the force.

D. O. MENDENHALL, employed in the testing and regulating department, Cincinnati, died in that city October 7. Mr. Mendenhall entered the company's service in 1894 and was formerly employed in the Toledo, Ohio office.

FRED SCHWAB, vacation relief manager, died at his home in Findlay, Ohio, September 29. He had been ill with typhoid fever ten days.

MISS NELLIE SHIELDS has been reappointed manager at West Carrollton, Ohio, vice F. H. Jung, on leave.

C. A. HARMON has been appointed temporary manager at Bedford, Ohio, vice L. N. Taylor, resigned.

## Chicago Western Union.

WILLIS H. CLARK has been appointed district commercial manager, vice G. W. Curtis, transferred to Cincinnati. Mr. Clark formerly was manager of "MB" branch office, Chicago.

EDWARD OLSON has been appointed manager of "MB" branch office, Chicago, succeeding W. H. Clark.

JOHN M. LONG, of the traffic department, has been appointed district commercial manager of the "Loop" district, a new position.

FRANK B. JONES, of the traffic department, has been appointed district commercial agent, succeeding Angus Chassells, resigned to accept a position with the Allied Packers.

## Western Union Gulf Division

W. T. SALISBURY, manager, Ardmore, Okla., has been promoted to the position of district commercial manager of the State of Louisiana, with headquarters at Alexandria. Hugh Cathey, formerly of the Mackay Company, Ardmore, succeeded Mr. Salisbury.

L. D. DECKER has returned to his position as chief clerk to Division Plant Superintendent Hilbert, after a few months' leave of absence.

W. T. GERMANY, division traffic inspector, has been promoted to assistant chief operator in charge of methods under chief operator Craighead, Dallas, Tex.

R. B. BLANCHARD has recently been appointed chief clerk to Division Traffic Superintendent Hancock, vice E. D. Winslow, resigned to enter a business of his own in Missouri.

W. E. WASHBURN, former manager at Ft. Smith, Ark., has been appointed assistant manager of the Dallas Traffic, under Manager L. A. Ott. F. D. Ward succeeds Mr. Washburn at Ft. Smith.

J. B. LATHAM has returned as manager at Abilene, Tex., after a few months' absence on private business.

J. D. AND J. R. ODEN have recently been appointed manager and operator, respectively, of the Waxahachie, Tex., office.

C. P. HEADEN, manager, Weatherford, Tex., has been transferred to Mineral Wells, Tex., to suc-

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ceed Mrs. H. B. Mosher as manager, who is now in the traffic department, Oklahoma City, Okla.

### New York Western Union.

THE OFFICES OF J. F. NATHAN, commercial general superintendent, Metropolitan Division, have been moved from 195 Broadway to the fifth floor of 395 Broadway.

A. A. MCNEIL, transfer agent, has been transferred from 24 Walker Street to the ground floor offices at 195 Broadway.

THE CREDITS AND COLLECTIONS DEPARTMENT, and the Complaint Bureau have been transferred from 24 Walker Street to 395 Broadway.

M. FRIEDBERG, of Mr. Nathan's staff, has resigned from the service to take up other work in Los Angeles, Calif.

THOMAS MUDDELL, wire chief of the Long Island division, has returned from his annual vacation.

THE OFFICE of Chief Operator George C. Gute has been moved from room 1323 to room 1325, 24 Walker Street, in order to provide room for the monitor department.

THE PREPARATIONS made by H. M. Heffner, assistant chief operator, Commercial News Department, to handle the large amount of telegraph matter incidental to the World Series basesball games, worked out admirably. The service was splendid.

L. P. TEBEAU, deputy vice-president, Association of Western Union Employees, has returned from the Denver convention.

THE FIRST DINNER of the Wire Club of New York was held at Churchill's, on Broadway. on the evening of Thursday, October 16, where an entire section of the main dining room was reserved for the evening. The dinner was a complete success, and all those who attended are unanimous that the dinners and theatre parties conducted by the club shall be continued at frequent intervals during the coming Fall and Winter.

MR. AND MRS. GEORGE E. PALMER, who recently returned from Chicago to New York, were the Club's guests at the dinner at Churchill's.

MISS MARY BURKHART, supervisor in the distributing center, 24 Walker Street, and Oliver A. Benson, multiplex attendant, were married on September 24.

### Boston Western Union.

A. STEVENSON, assistant chief operator, has returned from his annual vacation, during which period he added about ten pounds to his well-being.

JAMES F. MADIGAN has been appointed night wire chief, vice Edward Corrigan, transferred to late night duty.

FROM A TRAFFIC STANDPOINT all signs point to a heavy file of business this fall and winter. Generally, when the summer offices close, business shows a falling off, but this year the volume of business is so large that the closing of the summer offices was hardly noticed in the relaying offices.

ALBERT E. BRADLEY, repeater chief operator, and Miss Agnes J. Green, multiplex instructress, were married, Septembeer 25. Their honeymoon trip was to New York, Philadelphia, Washington and Richmond.

### Brooklyn, N. Y., Western Union.

M. J. HAYDEN, district commercial superintendent, fourth district, Metropolitan Division, and John Donovan, manager of Brooklyn main office, have built up a first class telegraph working organization in the Brooklyn district. A house organ called *The Telegram* is issued monthly, which is subscribed for and supported by Western Union employees in the entire Metropolitan Division.

T. A. MCCAMMON, city traffic supervisor, spent a few days in the Brooklyn district recently, inspecting offices.

JOHN DRISCOLL and his able assistants disposed of 199,952 words of press matter at the International Tennis Games at Forest Hills, August 25-30. At the Engineers' Club meet at Roslyn, Mr. Driscoll handled 30,000 words of press.

CAMP MILLS OFFICE, opened August, 1917, was closed in September last. During the time the office was open the following telegraphers were employed at that office: John Driscoll, Bernard Weisbein, L. R. Pitkin and C. A. Harvey.

JOSEPH LIPPMAN has been appointed manager of Long Island City office, vice Herbert E. Hayden. William H. Sembler has been appointed manager of the office at 242 Broadway, Brooklyn, vice L. R. Pitkin. Messrs. Hayden and Pitkin have been transferred to the commercial department.

### Detroit, Michigan, Western Union.

ALBERT L. WELLINGTON, chief clerk in the office of E. Boening, superintenent, Detroit, has been appointed district commercial manager with territory covering the southern portion of Indiana. Mr. Wellington has been in Western Union service almost continuously since 1876, having filled various responsible positions at Chicago, New Orleans, and Seattle.

LEE E. RAGSDALE, manager at Pontiac, Mich., has been promoted to the position of chief clerk to the superintendent, Detroit.

C. L. YUILLE has been transferred from the man-

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agership at Hammond, Ind., to the managership at Pontiac, Mich. He is succeeded at Hammond by William M. Fryer, formerly manager at East Chicago, Ind.

JOHN F. HUBBARD has been appointed assistant chief operator of automatics, vice Victor J. Beurer, transferred.

G. M. BRENTLINGER, general inspector, from Vice-President W. N. Fashbaugh's office, New York, has spent some time with the staff in the automatic department, Detroit. The fruits of his kindly and intelligent advice are already apparent in improved service.

AN ADDITIONAL three-channel multiplex was established between Detroit and New York on October 1. Detroit office maintains its organization up to the high standard necessary to keep moving promptly the gradually increasing volume of telegraph traffic.

## New York Telegraphers' Aid Society.

ANNUAL ENTERTAINMENT

The annual entertainment and reception of the New York Telegraphers' Aid Society will take place at the Central Opera House, 67th Street, near 3rd Avenue, New York, on the evening of November 11.

The entertainment will be of the ususal high order supplied at the gatherings of this society. The fact that no meeting was held in 1918, due to the war, has prompted the officers of the society to spare no efforts to make this year's gathering the standard for future affairs of the kind.

The net proceeds of these entertainments is devoted exclusively to those of the telegraph fraternity who may be in distress and who for any reason may be ineligible for membership in the Society.

The officers of the Society are: A. M. Lewis, president; E. F. Howell, vice-president; T. M. Brennan, treasurer; C. A. Kilfoyle, financial secretary, and Mary E. Saunders, recording secretary.

The Entertainment Committee appointed to conduct this year's entertainment consists of the following: In Western Union Telegraph service—W. J. Quinn, P. J. Tierney, R. F. Murphy, J. V. Riddick, F. J. Sheridan, W. E. Rath, T. F. Clark, J. F. Nathan, J. F. E. Hopkins, A. M. Lewis, F. J. Nurnberg, C. S. Pike, and J. N. Kelley. In Postal Telegraph Company's service—Eugene P. Tully, R. G. C. Carr, A. C. Ackerman, H. Zweifel, and J. A. McNulty. New York Stock Exchange—E. C. Cremins and W. W. Price. Broker telegraphers—N. J. Crean and F. L. Catlin. Telegraph and Telephone Life Insurance Association—E. F. Howell and N. M. Giffen. Erie Railroad—C. D. Reed. Long Island Railroad—J. Roe.

R. J. Marrin is chairman, and T. F. Clark, vice-chairman of the Entertainment Committee.

The fact that the date set for the gathering is the anniversary of Armistice Day, gives an added call for celebration.

## POSTAL TELEGRAPH-CABLE COMPANY.

WILLIAM B. DUNN, assistant secretary, reports he is enjoying his annual vacation.

WILLIAM C. DAVIET, assistant to the general manager, has just returned from an inspection trip covering offices in the middle west.

J. F. SKIRROW, assistant electrical engineer, has recently made inspections of facilities at Memphis, Cleveland, Cincinnati, and Pittsburgh.

E. P. TULLY, assistant to the general manager, is visiting offices in the Eastern Division on an inspection trip.

GENERAL SUPERINTENDENT E. W. COLLINS has returned from an inspection trip through the fifth district, Western Division.

A. F. ADAMS, during Government control of the telegraphs and telephones in charges of the property of the Postal Telegraph-Cable Company, and who is president of the Kansas City Home Telephone Company, is at the present time making a motor trip through England and Scotland.

MANAGERS APPOINTED: L. M. Wood, Madison, Ga.; B. S. McClane, Columbia, Tenn.; R. M. Maer, Marietta, Ga.; C. W. Ortt, Williams, Ariz.; F. C. Yearwood, Loudon, Tenn.; L. L. Landis, Carlisle, Pa.; C. N. Schiermer, South St. Paul, Minn.; F. E. Fellin, Westchester, Pa.; George A. McCauley, Greenwood, S. C.; E. D. Hebband, Lexington, Neb.; W. H. Dant, Clinton, Ia.; Edward MacGregor, Long Branch, N. J.; Irving Rubin, Suffern, N. Y.; Mrs. L. N. Kommons, High Point, N. C.; Miss E. J. Ferree, Burlington, N. C.; W. B. Rosson, Culpepper, Va.; A. B. Hanson, Charlottesville, Va.; V. J. Fabian, Columbus, Ga.; Dorothy Douglas, Oldsmar, Fla.; O. T. Moore, Danville, Va.; L. O. Ryon, Portsmouth, Va.; R. W. Webb, St. Augustine, Fla.; H. J. Reinhardt, 23 Union Square, New York; W. Finley, 944 Broadway, New York; P. J. Rebecca, 75 Madison Avenue, New York; Mrs. H. N. Clark, Wilmerding, Pa.; Joseph Breen, New Castle, Pa.; Mrs. F. E. Albright, Butler, Pa.; W. G. Deane, night manager, Rochester, N. Y.

## Postal San Francisco Notes.

G. W. PARSONS, late night chief operator, has been laid up with rheumatism the past few weeks, his hours of duty being filled in by night chief operator Don H. Townsend.

WILLIAM HEARN, until recently superintendent of the first district, Pacific Division, is spending the autumn months on his ranch at Kenwood, Sonoma County.

A. S. KIMES is working the Portland duplex

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nights, with operator T. W. Sanford at the Portland end.

C. D. CLARK is acting as chief operator of the Seattle, Wash., office, vice Mr. Eller, resigned to enter business for himself. Mr. Clark has for some years been assistant chief operator of the Seattle office.

CHRIS HANES, for some time employed in this office on heavy circuits, has gone to Denver, Colo., where he will be located in the future.

R. D. THOMPSON, traffic chief, has returned from his annual vacation, which he spent touring Northern California by automobile.

G. C. WOODWARD, assistant night chief operator, has returned from his vacation which he spent on his ranch near Sacramento.

J. M. FURR, of the First New York circuit, is on his vacation, being relieved by Edward Ridgeway.

### Airplane Falls on Line.

J. J. Lynch, superintendent of construction, Pacific Division, Postal Telegraph-Cable Company, San Francisco, Calif., reports that recently lineman M. J. Mahoney, at Barstow, Calif., started out on a case of wire trouble, and after arriving at the difficulty telegraphed the wire chief to the effect that "An airplane flew through the wires and pulled down two poles."

From a point 1,000 feet high in the air a telegraph line must appear as a difficult mark to hit; especially, as Mr. Lynch points out, where the line stretches across a desert such as exists in the neighborhood of Barstow, and where landing places are plentiful.

### New Western Union Telegraphic Code, Five-Letter Edition.

The New Western Union Telegraphic Code, Five-Letter Edition, has recently been placed on the market and the large sales of the book testify to its rapidly growing popularity. The business man needs this work, and when he sees it he instantly adopts it. The book contains 380,000 phrases, each phrase being represented by a five-letter word. These words are pronounceable singly or when two of them are joined together. The latter results in the saving of fifty per cent in cable tolls. The book weighs fifteen pounds, contains about 2,000 pages and measures thirteen inches in length by eleven inches wide, and is three and one-half inches thick. There is no waste space in the book. Every telegraph manager should call this book to the attention of his customers. The price is $30.00 per copy and it is on sale at the office of TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

## THE CABLE.

### Additional Pacific Cable Project.

SIGNAL CORPS REPORT SAYS NORTHERN ROUTE IS FEASIBLE.

A marine cable by the so-called northern route, connecting Cape Flattery, Washington and Asia by way of Alaska and the Philippine Islands, is practical and should suffer no interference from ice, in the opinion of War Department officials expressed in a report submitted October 15, to the Senate Commerce Committee considering legislation authorizing the laying of a new transpacific cable.

The report prepared by Lieutenant Colonel B. O. Lenior of the Signal Corps, also recommends two auxiliary routes. One would be through arrangements with the radio station at Anadyr, Siberia, to foward messages to Vladivostok, as the wireless station at Nome, Alaska, now can work with that station. The other would be the use of the present Alaskan cable to Valdez, Alaska, where a radio station could be constructed to work with another station on the western limits of the Aleutian Islands, from which point a cable line could be constructed extending 1,600 miles to the Japanese Islands.

### Submarine Cable Testing.

We have received a supply of "Darby and Fisher's Students' Guide to Submarine Cable Testing," fifth edition, one of the most popular books on this important subject.

The book contains 240 pages and deals with all tests and measurements made in modern submarine cable practice. An appendix is included which contains answers to all questions presented in the main work.

The price of the book is $4.50 and copies may be had from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

### Submarine Cable Working.

"Beginner's Manual of Submarine Cable Testing and Working," by G. M. Baines, is a book of 265 pages dealing in a thorough manner with the operation of submarine telegraphs.

The first four chapters contain elementary matter relating to batteries, electrical laws, etc. Chapter V. covers copper resistance of cable, instrumental zero, false zero, theory of false zero test; and in the following eighteen chapters up to date matter is incorporated explaining cable insulation tests, inductive capacity of cables, tests for broken cables, curb transmitter, mouse mill device, recorder adjustment and other matter which should form a part of every cable man's technical knowledge.

The price of the book is $4.50, and copies may be obtained from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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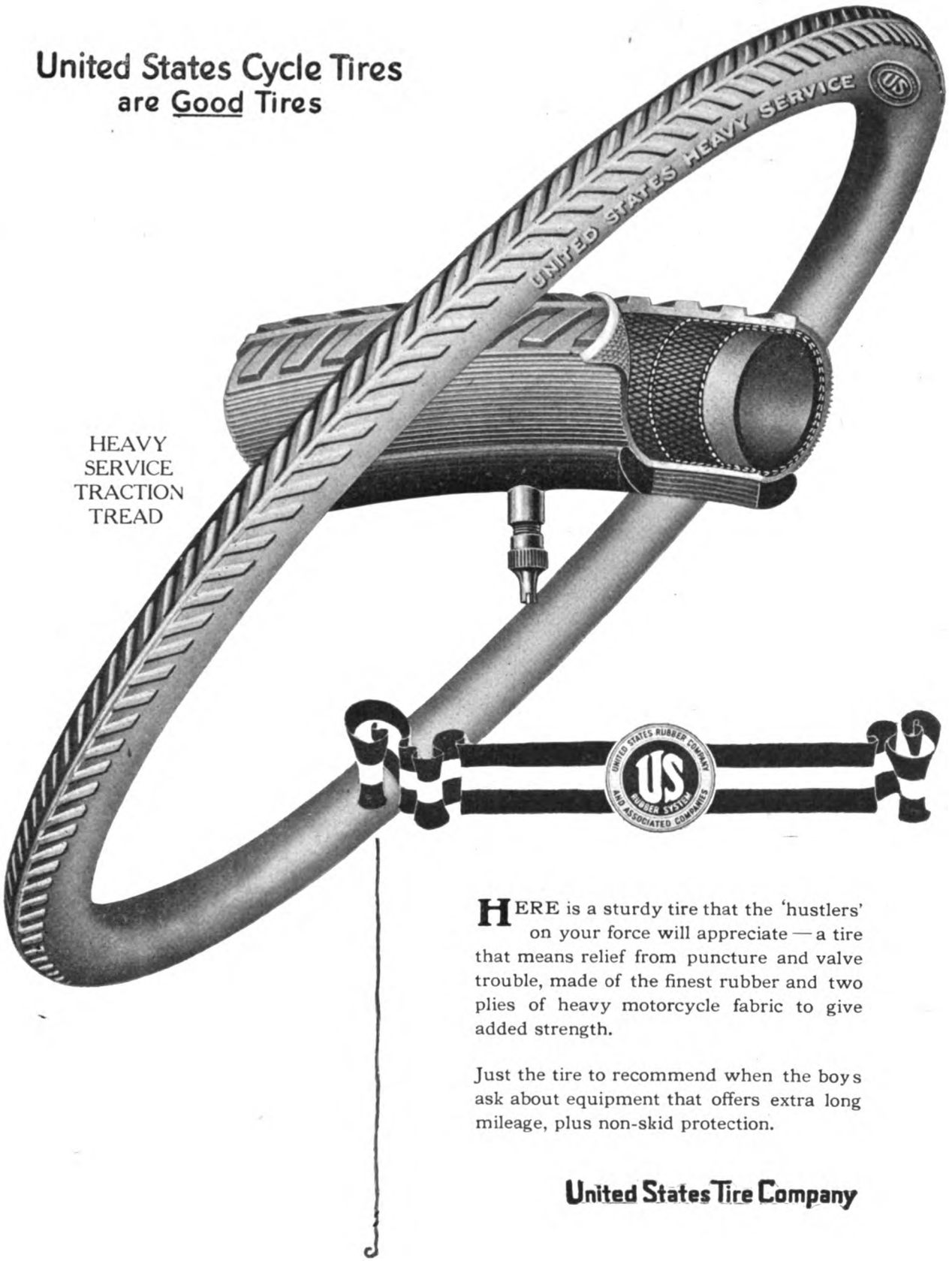
## United States Cycle Tires are Good Tires

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**United States Tire Company**


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## RADIO TELEGRAPHY.

### Marconi Notes.

MELVIN C. STEINER has been appointed purchasing agent of the company, vice J. A. Sheridan, resigned.

ADAM STEIN, JR., assistant chief engineer, is enjoying his annual vacation on the Massachusetts coast.

LEE LEMON, formerly production manager at the Marconi Works, Aldene, N. J., has been transferred to the general manager's office, New York, on special duty.

BRANCH OFFICES of this company have been established at Savannah, Ga., and Norfolk, Va.

THE GEORGIA RAILWAY AND POWER COMPANY has made arrangements to place in service along its high tension transmission lines a system of wireless telephony. Equipment will be installed at all substations and power plants.

FREDERICK G. SIMPSON, during the war, a commander in the United States Naval Service, has returned to private life and resumes his duties as vice-president and general manager of the Kilbourne and Clark Company, Seattle, Wash., manufacturers of radio telegraph apparatus.

### Radio Control Plan

SUBMITTED BY THE SECRETARY OF THE NAVY.

A new policy for control and development of radio communications was laid before Congress, October 15, by Secretary Daniels. It provides for maintenance of both naval and private stations, with the latter under control of a national radio commission, and proposes to open existing or new stations to general public correspondence at rates to be fixed by the Navy Department and Congress. General public transoceanic correspondence through naval stations would not be permitted however, except during temporary suspension of private service.

Private radio stations would be licensed by the commission, and their corporate affairs, apparatus, operators and transmission rates would be under supervision of the commission, which would be composed of four members and a secretary appointed by the President with representatives from the Navy, War, Commerce and Post Office Departments. The secretary would be an active line officer of the navy.

The commission would be authorized to assist Americans in establishing radio facilities with foreign countries and to represent the government in international radio conferences. It also would attend board meetings of private companies.

Under the bill, aliens or alien interests could not obtain licenses from the commission and all officers and directors of private radio companies would have to be American citizens. A majority of stock of such companies also would have to be held by Americans.

In presenting the bill Secretary Daniels struck out a provision in his previous tentative measure, providing for acquisition by the Navy of existing stations or those under construction, and that giving the Navy Department exclusive control of all radio operations in the future.

Private radio companies would not be permitted to affiliate with submarine, cable or land telegraph or telephone systems without consent of the national commission, and would not be permitted to operate in the Philippines or the Panama Canal zone.

## RADIO CORPORATION OF AMERICA.

### Marconi Company-General Electric Company Combination.

E. J. NALLY, PRESIDENT OF THE NEW COMPANY.

During the war the art of long distance wireless communication progressed to such an extent as to make it clear that this new means of communication is reliable. The crowded condition of all communication facilities, particularly cables, is such as to make it necessary from the point of view of the commercial interests of the country that this new factor in communication should be developed as rapidly as possible. Political, diplomatic and national reasons require that there should be ample radio facilities in the hands of one or more exclusively American concerns.

The American Marconi Company, which is the largest and strongest wireless company in this country, has the disadvantage of having a substantial percentage of its stock held abroad, and because of patent agreements with the British Marconi Company, of having its operations limited to the United States.

The research laboratories and engineering force of the General Electric Company have been working for a number of years on radio matters, and radio apparatus of great value has been developed which was used by the Government during the war for important communications.

A new corporation has been formed called the Radio Corporation of America, which has taken over the radio rights of the General Electric Company and which has proposed to the American Marconi Company to take over its patents and stations and some other of its assets. The directors of the American Marconi Company have approved this arrangement and have called a meeting of their shareholders on November 20, to pass upon it finally.

If this proposed arrangement goes through the block of shares in the American Marconi Company held by the British Marconi Company will be acquired by the General Electric Company and steps

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will be taken immediately under contracts and concessions already in existence to set up high grade commercial communication with England, France, Norway, Japan, Hawaii, Cuba and South America. It is proposed to extend the communications to China and various other countries as rapidly as possible.

Arrangements will be made such that the new company must permanently remain under American control. It will be amply provided with capital; none of its stock is offered on the market. It will enjoy the full technical assistance of the General Electric Company and of its research laboratories and will retain the highly developed staff of the American Marconi Company.

The new company will enjoy exclusively the patent rights of the British Marconi Company for the United States and Cuba and will be entitled to licenses under its patents in various other countries. In addition it will be in a position to enter into traffic arrangements with respect to communication in various important countries.

Mr. Edward J. Nally, who has spent his life in the communication business, and for the past six years has been vice-president and general manager of the Marconi Company, will be the first president of the Radio Corporation, which will have a strong board of directors.

## Institute of Radio Engineers.

At the regular monthly meeting of the Institute of Radio Engineers to be held in the Engineering Societies Building, New York, Wednesday evening, November 5, a paper on "Static Elimination by Directional Reception" will be presented by Greenleaf W. Pickard. There will be presented, with illustrations, an account of extensive researches over a period of years, dealing with the reduction of atmospheric disturbances in radio reception.

## New Radio Call Book.

The Consolidated Radio Call Book, which contains 2,500 calls in addition to those listed in the Berne Bureau's call book of April, 1918, is now ready for distribution. The book will be of great value both to the amateur as well as the professional radio operator. In addition to the complete list of radio ship and shore station calls of all nations the book contains a large amount of information relative to radio traffic handling, rates, etc. Copies may be purchased from TELEGRAPH AND TELEPHONE AGE, at $1.00 per copy.

## Radio Buzzer Sets.

TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York, can supply buzzer sets for learning the continental alphabet by means of buzzer signals, the same as heard in telephone receivers used in regular radio working. These sets are equipped with key, high-tone buzzer, and flash lamp signal, complete on one base. The price is $3.50 for the set.

## American Telephone and Telegraph Company.

OFFICIAL CHANGES

Effective October 1, the following official changes were made in the organization of the American Telephone and Telegraph Company:

Union N. Bethell, director, resigned.

Moses Williams, director and member of Executive Committee, deceased.

DEPARTMENT OF OPERATION

Edward K. Hall, New York, elected vice-presdent.

DEPARTMENT OF DEVELOPMENT AND RESEARCH

H. S. Warren, title changed to electrical interference engineer.

G. A. Campbell, New York, appointed research engineer.

DEPARTMENT OF ACCOUNTS AND FINANCE

C. A. Heiss and H. Blair-Smith appointed assistant comptrollers.

Position of general auditor discontinued.

J. F. Behan appointed chief accountant.

LONG LINES DEPARTMENT

T. G. Miller appointed general superintendent of plant.

R. M. Crater, attorney, transferred to Legal Department (General).

Position of auditor of disbursements discontinued.

M. R. Koehler appointed secretary, employees' Benefit Fund Committee, succeeding P. W. Saxton.

## New England Telephone and Telegraph Company

N. C. Kingsbury elected director and member of Executive Committee succeeding U. N. Bethell, resigned.

## New York Telephone Company

N. C. Kingsbury elected director and member of Executive Committee succeeding U. N. Bethell, resigned.

U. N Bethell, president, resigned.

SAN FRANCISCO had on August 1, 1919, 138,310 telephones, and Los Angeles, 128,705 telephone stations of the Pacific Telephone and Telegraph Company.

THE PROVINCE of Alberta, Canada, which owns its telephone lines, recently raised service rates in cities 25 per cent.

N. R. POWLEY has been appointed division commercial superintendent, Southern Division of the Pacific Telephone and Telegraph Company. Mr. Powley also assumes the duties of commercial superintendent of the Southern California Telephone Company, vice C. F. Mason, resigned.

N. WIGTON was, on September 1, appointed rate engineer, Pacific Telephone and Telegraph Company.

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## OBITUARY.

### Death of F. H. Tubbs.

As briefly mentioned in our October 16 issue, F. H. Tubbs, for nearly forty years superintendent in the Chicago district, Western Union Telegraph Company, died in Chicago on October 4.

Mr. Tubbs learned telegraphy at the age of fourteen years and secured employment on Wade and Speed telegraph lines, and during the organization of the service inaugurated by those pioneer telegraph builders, Mr Tubbs instructed operators, opened offices and was instrumental in establishing the first telegraph service through the Central Western States. Later he became the first superintendent of telegraph of the Chicago, Burlington and Quincy Railroad Company, where he remained nineteen years. Mr. Tubbs then entered the service of the American Union Telegraph Company as superintendent at Chicago, continuing with the Western Union Telegraph Company in the same capacity after consolidation.

Mr. Tubbs retired from active service in 1909, and since that time, with his wife, has lived at the Plaza Hotel, Chicago. He was eighty-five years of age at the time of his death, and is survived by his wife and a brother, Charles Tubbs, of Casper, Wyo.

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JOHN F. FLAGG, expert telegrapher, and for many years correspondent in New York for the Philadelphia *Enquirer*, died of spinal meningitis, at his home in Brooklyn, on October 17.

---

ALBERT E. VAN TYNE, for more than fifty years an employee of the Western Union Telegraph Company, died in St. Louis, Mo., October 18, at the age of seventy-two years. At the time Mr. Van Tyne entered the telegraph service in St. Louis as a messenger boy the force consisted of three employees.


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**Volunteer for RED CROSS**

**Enlist now for the Third Roll Call. Twenty Million members are to be enrolled November second to eleventh, inclusive. Your heart, your hand, your dollar is needed in order to keep the pledge abroad and to fulfill demands at home. Give one week's service to Humanity—It pays your conscience the biggest dividend on Americanism.**


### A New Book on Radio.

Ellery W. Stone, the well known radio engineer, connected with the United States Radio Station at San Diego, Calif., has written a book entitled "Elements of Radiotelegraphy."

The author has succeeded in producing a book which covers in a logical way a study of the elements, the theory and the practice of wireless telegraphy. There is just enough historical reference to enable the student to gain a proper persective of radio invention and development.

All practical systems of radio signaling are described and illustrated, including the Marconi, Telefunken, Fessenden, Kilbourne and Clark, Haller Cunningham, Multitone, and Poulsen. What Mathematics is employed is of the simplest and easily worked out.

The book is of particular value to commercial and railroad telegraph students who are not familiar with advanced mathematics, and who desire to learn the operation of radio transmitting and receiving sets.

The book is bound in limp cloth and contains 267 pages.

Price, $2.50 per copy. From TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.


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# Telegraph and Telephone Age

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No. 22. NEW YORK, NOVEMBER 16, 1919. Thirty-seventh Year

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### Examinations for Telegraphers.

One desirable betterment which is on the way—and which has long been delayed—is a system of examinations for telegraphers seeking employment, and for those seeking advancement in the service.

The Telegraph and Telephone Division of the American Railroad Association has a committee known as the Future Activities Committee, of which Mr. G. A. Cellar is chairman. Recently Mr. Cellar called upon members of the committee to forward suggested subjects for consideration. One suggestion sent in independently by three different members, widely separated geographically, is that plans be made to frame examinations which telegraphers may take in order to establish their professional status and their fitness for promotion.

Mr. J. A. Jones, superintendent of telegraph, Southern Railroad, Charlotte, N. C., has already put into practice a test for telegraphers, at first with the object of improving the handling of switchboards at way offices on the lines of the Southern Railroad.

It is very likely that the Telegraph and Telephone Division of the American Railroad Association will, before long, decide upon a scheme of instruction and a set of examination questions which will be uniform for all railroads. The apparatus employed in telegraphy and telephony on all roads is practically standard, and it should be an easy matter to standardize the degree and kind of knowledge necessary to the efficient management of the apparatus.

Some years ago the Union Pacific Railroad, under the direction of the superintendent of telegraph, got up an elementary educational course for telegraphers; the instruction booklet issued containing photographic reproductions of the wiring of simple Morse circuits and of way office switchboards with the wires and plugs arranged in different pictures to show various patches possible with the type of board used.

The work done in preparing the photographs and in writing the accompanying text matter was excellent, and it is possible that, when a uniform scheme of instruction is undertaken, advantage can be taken of the efforts made on the Union Pacific Railroad.

In British post office telegraph service it has, for many years, been compulsory for all applicants for entry to the service to take prescribed examinations —more advanced examinations being provided in order to determine fitness for promotion. These examinations have been of particular value to the employee in giving him a positive means of determining for his own satisfacton how his ability or fitness compares with that of other employees.

In radio telegraph service, it is necessary for the applicant for a position to secure a government license, and to procure this license the operator is required to pass a rigid technical examination. Even to be eligible for membership in the radio operators' labor union, the applicant must possess a government license, showing his professional standing.

For railroad and commercial telegraph requirements, the examinations should be graded, say, into first, second and third class—the first class examination being for men qualified for the position of wire chief, chief operator, or junior engineer.

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# AN OSCILLOGRAPHIC STUDY OF A HOWLER SET

By Lindley Pyle.

The need of a simple device yielding sustained high frequency ocillations of the order of 1,000 cycles per second led the author to an oscillogaphic study of the performance of the so-called "howler" apparatus, the action of which is illustrated by the shrill note emitted when the receiver of a telephone circuit is presented to the mouthpiece of the transmitter.

A telephone transmitter, T (Fig.1), capable of continuous operation at one-half ampere under an applied potential difference of 12 volts, was placed in series with eight fresh dry cells and a fixed non-inductive resistance, *r*, of one ohm, the resulting current traversing the primary of a small induction coil whose vibrator was closed and blocked from action. An ammeter, A, and key, *k*, were usually included in the circuit. A head-type telephone receiver, R, of 1,000 ohms resistance was connected to the secondary of the induction coil, the resistance of the secondary being 1,000 ohms. When the mouthpiece of the transmitter was brought close to the diaphragm of the receiver, a musical note was emitted by the latter upon closing *k* or upon tapping the instrument if *k* were already closed. The pitch of the note is dependent upon the nearness of the mutually excited diaphragms, upon the resistance of the receiver circuit, and upon the way in which the receiver happens to be connected initially to the secondary terminals. In order to study the motion of the receiver diaphragm, use was made of the device termed by D. C. Miller, the "phonodeik," as described in his book on "The Science of Musical Sounds." A piece of thin thread was attached by sealing wax to the centre of the rear face of the diaphragm, the other end being led out through a hole in the rear of the receiver case. The thread was then wrapped around a fine needle mounted to rotate freely with its axis parallel to the face of the diaphragm (See *n*,Fig.1). The thread was then tied to a rubber band, *b*, which in turn was attached to a fixed point. A beam of light from a pin-hole impinged upon a minute mirror attached to the needle and was focused upon a photographic plate, P. which could be moved rapidly across the beam of light in a direction parallel to the axis of the needle. Development of the plate yielded an oscillogram of the mechanical vibrations of the diaphragm of the receiver. It was computed from observed data that the extreme displacement of the diaphragm was of the order of 0.01 millimetre. A Duddell oscillograph was used to study the variable currents in the receiver and transmitter circuits. Fig.1 makes plain how the oscillograph was connected in circuit.

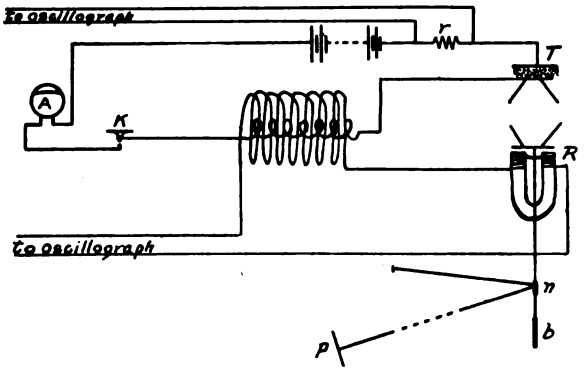

Fig 1

Fig. 2 is an oscillogram of the high frequency alternating current in the receiver circuit. On the same film a simultaneous record was taken of a 57-cycle per second alternating current delivered by the local power house. The higher frequency was found to be 1,270 per second. The line of zero current does not extend through the centre of the current trace. The maximum current values in one direction exceed the maximum current values in the other direction by approximately 25 per cent of the arithmetical mean of the maxima, this being characteristic of all the receiver circuit records.

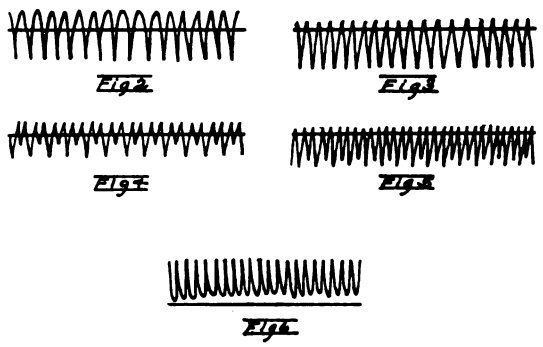


Fig. 3 is the corresponding oscillogram of the vibrations of the receiver diaphram. The zero line corresponding to the position of the undisturbed diaphragm is markedly displaced from the centre of the oscillation record. In fact, the diaphragm in action swings *eight* times further *from* the attracting magnet than it swings *towards* it. This is not due to lost motion in the phonodeik system, for the zero mark is in the same position after taking a record as before. Fig. 4 shows a not infrequent type of oscillation where there is a regulary alternating variation in height of one set of maxima.

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Fig. 5 shows the simultaneous behavior of the receiver diaphragm.

It was thought worth while to study the variation in the primary, or transmitter circuit. Accordingly, the Duddell instrument was connected to the terminals of the non-inductive resistance (Fig. 1) in order to obtain an oscillogram showing the nature of the current traversing the transmitter.

Fig. 6 shows a careful copy of the very faint film record obtained. A projection lantern was used to throw an image of the film upon a sheet of white drawing paper. The lines of the image were traced in pencil and were then photographed to give the published figure. The striking feature is the wide range of fluctuation in the unidirectional current in the transmitter circuit. The current as read on a Weston direct-current ammeter was 0.50 ampere. As reckoned from the line of zero current the mimimum values of the current are approximately 8 per cent. of the maximum values.

The "howler" apparatus used in these experiments will give a sustained high frequency current of the order of 1,200 cycles per second, with no erratic variation in frequency after once set in operation. The operation has been maintained for half an hour with no personal attention whatever. The high frequency current, of course, departs widely from a sinusoidal form. The piercing note emitted by the diaphragm of the receiver is the only annoying feature about the device. The action continues even with as much as 80,000 ohms in the receiver circuit. The human body itself may be introduced into the receiver circuit without painful physiolgical effects. The effective current strength (as measured on a Rowland eletrodynamometer) in the receiver circuit when no auxiliary resistance is present is about 5 milli-amperes; there is then present 2,000 ohms resistance and considerable inductance. For effective operation it is necessary to keep the primary circuit of low resistance in order that variations in the resistance of the carbon granules of the transmitter may be a high percentage of the total resistance of the circuit. Trial should be made to determine how the terminals of the secondary should be connected to the receiver. The oscillations will be set up with greater ease in one case than when the terminals are reversed. When the transmitter circuit is closed the sound wave thrown from the excited receiver diaphragm against the transmitter diaphragm may be such as to decelerate the motion of the latter rather than accelerate it. The device should be useful as a generator of high frequency currents where sinusoidal currents are not demanded. —*Reprinted from the Washington University Studies Vol. 6, Scientific Series No. 1, 1918.*

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IN THE YEAR 1879, the Baltimore and Ohio Telegraph Company was organized. In the same year the American Rapid Telegraph Company was organized with a capital of $3,000,000, remaining in existence about four years.

## SLIDE-RULE ERRORS.

BY W. L. DURAND

A short time ago the writer was talking on the subject of slide rules with a man who in the course of the conversation said: "I have always wanted to investigate the possibilities of a rule in which the scale is laid off on a logarithmic curve. By this means the divisions would be uniform throughout the entire length of the scale. Then the error would be the same instead of variable, as in the present rule, where the divisions are so much greater at one end than the other."

This remark set me to thinking, and a short investigation served to show that, while the divisions would be uniform, the angle through which the part corresponding to the sliding scale of an ordinary slide rule would have to be moved would vary to the same extent as the divisions on the ordinary rule. Thus a rule of this type would be no more accurate than the present type.

Further investigation showed that the percentage error of a slide rule due to an error of any definite distance in reading is the same at any part of the rule. This can easily be proved as follows:

Let $A_1$ = first correct reading.
$B_1$ = first observed reading.
$E_1$ = first error in actual distance on the rule.

Then, since distances are logarithms of the scale numbers, we have,

$$E_1 = \log B_1 - \log A_1 = \log \frac{B_1}{A_1}$$

Let $A_2$ = second correct reading.
$B_2$ = second observed reading.
$E_2$ = second error in actual distance on the rule.

Then, as before,

$$E_2 = \log B_2 - \log A_2 = \log \frac{B_2}{A_2}$$

Hence, if $E_1 = E_2$, we have,

$$\log \frac{B_1}{A_1} = \log \frac{B_2}{A_2}, \text{ or } \frac{B_1}{A_1} = \frac{B_2}{A_2}$$

Therefore the percentage error is the same in both cases.

For a non-mathematical proof, take a hypothetical case, assuming an error in a 10-in. slide rule of 0.01-in. type. This will mean adding 0.001 to the logarithm of the number.

The log of 2.00 = 0.30103.

Adding 0.001 gives 0.30203.

The antilog of 0.30203 is 2.0046, which gives an error of 0.23 of 1 per cent.

The log of 8.00 = 0.90309.

Adding 0.001 gives 0.90409.

The antilog of 0.90409 is 8.0184, which gives an error of 0.23 of 1 per cent.

In order to determine the accuracy of a 10-in. slide rule, or rather the error in using a rule of this size, the writer took sixty sets of three-figure num-

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bers and multiplied them first on the slide rule and then on a multiplying machine. The numbers were chosen at random, but so as to take in all parts of the rule, and the answers were such that all parts of the rule were included. The two sets of answers were then subtracted and the plus or minus error determined. The greatest error was 0.15 of 1 per cent and the least 0. The average of all the errors was 0.06 of 1 per cent. There were 29 plus and 30 minus errors and the difference between the sum of the plus and minus errors was 0.60 of 1 per cent. This divided by 60 (the total number of operations) gives 0.01 of 1 per cent as the error for each operation. Where the work consists of only a few operations they may not balance off as well as with a large number; and the probable error for a short series would presumably be greater than the number of figures in the series $\times$ 0.01 of 1 per cent.

From these figures it is certain that the probable error for any one operation should not exceed 1/10 of 1 per cent and that the probable error for a series of operations should not exceed 2/100 of 1 per cent for each operation. This would mean that, due to the balancing of the plus and minus errors, the error for a series of five operations should not exceed that of a single operation, while for one of ten operations the total error should not be over 0.2 of 1 per cent.

Of course, the personality of the observer enters to a large extent into any determination of this character, and other observers would probably get results either greater or less than those given above; but the order of the figures would be the same and the difference should not exceed 25 per cent.

—*Electrical World.*

## CAPITAL, LABOR, MANAGEMENT.

"1. I believe that Labor and Capital are partners, not enemies; that their interests are common, not opposed; and that neither can attain the fullest measure of prosperity at the expense of the other, but only in association with the other.

"2. I believe that the Community is an essential party to industry and that it should have adequate representation with the other parties.

"3. I believe that the purpose of industry is quite as much to advance social well-being as material prosperity; that, in the pursuit of that purpose, the interests of the Community should be carefully considered, the well-being of employees fully guarded, Management adequately recognized and Capital justly compensated, and that failure in any of these particulars means loss to all four parties.

"4. I believe that every man is entitled to an opportunity to earn a living, to fair wages, to reasonable hours of work and proper working conditions, to a decent home, to the opportunity to play, to learn, to worship and to love, as well as to toil, and that the responsibility rests as heavily upon industry as upon government or society, to see that these conditions and opportunities prevail.

5. I believe that diligence, initiative and efficiency, wherever found, should be encouraged and adequately rewarded, and that indolence, indifference and restriction of production should be discountenanced.

"6. I believe that the provision of adequate means of uncovering grievances and promptly adjusting them, is of fundamental importance to the successful conduct of industry.

"7. I believe that the most potent measure in bringing about industrial harmony and prosperity is adequate representation of the parties in interest; that existing forms of representation should be carefully studied and availed of insofar as they may be found to have merit and are adaptable to conditions peculiar to the various industries.

"8. I believe that the most effective structure of representation is that which is built from the bottom up; which includes all employees, which starts with the election of representatives and the formation of joint committees in each industrial plant, proceeds to the formation of joint district councils and annual joint conferences in a single industrial corporation, and admits of extension to all corporations in the same industry, as well as to all industries in a community, in a nation, and in the various nations.

"9. I believe that the application of right principles never fails to effect right relations; that "the letter killeth but the spirit giveth life"; that forms are wholly secondary, while attitude and spirit are all important; and that only as the parties in industry are animated by the spirit of fair play, justice to all and brotherhood, will any plan which they may mutually work out succeed.

"10. I believe that that man renders the greatest social service who so co-operates in the organization of industry as to afford to the largest number of men the greatest opportunity for self development and the enjoyment of those benefits which their united efforts add to the wealth of civilization."

If you also believe in these principles—and they all seem sensible and reasonable—you believe as John D. Rockfeller, Jr., does, for these are the principles submitted by him to a recently held industrial conference.

## The Drawing of Plans and Diagrams.

An excellent book on the subject of engineering drawing is Engineer Draughtsmen's Work, a pocket size book of ninety-six pages which describes the use of drawing instruments; how to do sketching, designing, leveling and surveying; how to handle drawing paper, blue prints and tracings. The book also contains suggestions for the branches of scientific knowledge advisable to be studied by draughtsmen.

The price of the book is $1.00, and copies may be purchased from TELEGRAPH AND TELEPHONE AGE, 253 Brodway, New York.

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# THE MORKRUM PRINTING TELEGRAPH SYSTEM

## FULL DESCRIPTION OF OPERATION

*(Continued from November 1 issue.)*

### AUTOMATIC TRANSMITTER.

*General Description.*—The automatic transmitter is a device for transmitting to the line the code combinations of positive and negative intervals corresponding to the characters perforated in the tape.

In the transmitter are five contact tongues playing between two sets of contacts, one set being connected to negative or marking battery, and the other set to positive or spacing battery. The five contact tongues themselves are connected to five segments on the transmitting commutator.

Each of these five contact tongues is mechanically connected to one end of an irregularly shaped lever, known as a tape pin contact lever, shown in Figure 14. It will be seen that this lever has three extensions A, B and C. The lever is pivoted on a shaft S.

When the lever is in its normal position, extensions A and C are approximately horizontal though in different planes. Extension B is normally in a vertical position.

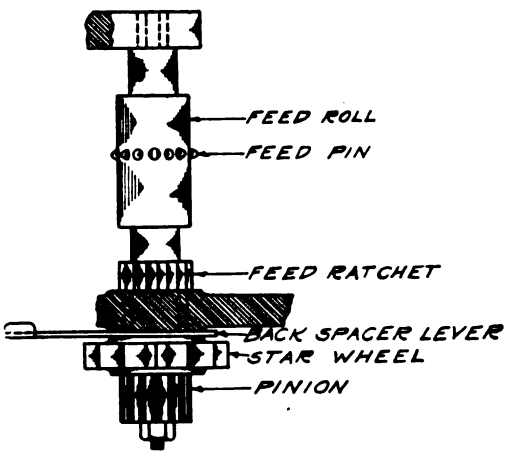


FIGURE 11. TAPE FEED MECHANISM.

The extension C is curved upward at the end, and set into it is a small tape pin, projecting vertically upward. The arrangement of the levers is as shown in Figure 15. The distance between the upward projecting tape pins corresponds to the spacing of the holes in the perforated tape.

Mounted just to the right of extensions B of the five levers is a pivoted armature. A magnet is so mounted that when it is energized, it pushes a plunger rod against the armature, moving it to the left, and striking the ends of the B extensions of the levers, thus moving them with it. This movement causes the tape pins in the ends of the extensions C of the levers to be drawn below the surface of the plate over which the perforated tape passes. This movement of the levers also causes the outer ends of extensions A to move upward. Since the contact tongues are pivotally attached to these extensions they also move upward, and are pressed against the upper contact screws.

The contact tongues are so attached to extensions A of the levers that after the tongues have touched the upper contacts, any further travel of the lever extensions A, is absorbed by the springs attached to the contact tongues.

To the right of the tape pins, and projecting through the plate, through which the pins themselves project, is a feed wheel, similar to the feed roll of the perforator. The twelve pins in this feed wheel mesh with the feed holes in the perforated tape, and as the feed wheel is rotated, the tape is caused to move from right to left over the top of the tape pins.

*Feed Mechanism.*—Pivoted on the shaft S with the five tape pin contact levers is a sixth lever, known as the feed lever. When the vertical extension B of this lever is moved by the operation of the magnet, the outer end of the horizontal extension C moves downward. Attached to the end of extension C is a feed pawl, which, when it moves downward, engages a tooth in a ratchet. This ratchet is attached to the shaft carrying the feed wheel. Thus, the downward movement of this pawl causes the feed wheel to rotate the distance of one tooth of the ratchet. Pressing between the teeth of this ratchet is a detent to insure an even movement of the feed wheel.

The position of the feed pawl is such that when the magnet operates, the downward movement of the feed lever does not cause it to engage with the ratchet until the five tape pins have been withdrawn below the plate. This insures that the tape shall not feed while the pins are projecting through the tape, and prevents the tearing of the tape.

*Setting Up the Combination.*—When the transmitter magnet is de-energized, the springs attached to the contact tongues exert a downward pull on the A extensions of the tape pin contact levers. This causes the C extensions to move upward and the tape pins are pressed against the tape.

The tape in the meantime has moved forward the space of one letter. If any holes have been perforated in the tape in its present position, the pins

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corresponding to these holes will pass through them. The additional upward movement allowed a lever when its pin passes through a hole enables the contact tongue attached to the A extension of this lever to move from its upper or spacing contact screw down to the lower or marking contact screw.

Where there is no hole in the tape the corresponding pin will be blocked and the corresponding contact tongue will remain against the upper or spacing contact screw.

It is readily seen from the above that where there is a hole in the tape the corresponding contact tongue is moved against its marking contact, and negative or marking battery is connected to the corresponding segment of the transmitting commutator. Where a pin is blocked by the tape the corresponding contact tongue rests against the spacing contact, and the corresponding segment of the transmitting commutator is connected to positive, or spacing battery.

The operation of the transmitter magnet is controlled by a cam operated contact. The cam is attached to the transmitter shaft of the distributor and allows the contact to close for a brief period during each revolution. The time of closing is immediately after the transmitter brush passes over the fifth selecting segment.

*Auto Stop.*—An automatic stopping device is provided to take care of any difference between the rate at which the perforator operator prepares the tape and the rate of transmission. Since the prepared tape is fed directly from the perforator to the transmitter, it is evident that if the perforator operation is interrupted, the transmitter will use up the slack tape and mutilate the feed holes unless an automatic stop for the transmitter is provided.

The auto stop is mounted on the table to the right of the transmitter, and consists of a switch, whose contacts are opened by the lifting of a lever. This lever projects forward between perforator and transmitter, so that the tape feeding into the transmitter passes under it. The rate of transmission is greater than that of perforation, the tape will be pulled taut, raising the lever and opening the auto stop contacts, thus interrupting the operation of the transmitter. When the perforation is again resumed the tape will become slack, and the contacts closed, allowing the transmitter to again operate.

The electrical circuits controlling the operation of the transmitter are shown in Figure 17. The transmitter cam is mounted on the distributor transmitter shaft, and the auto stop relay on the base of the distributor. It will be seen from this diagram that the transmitter cam brush is connected to the battery, and the cam contact is connected both to

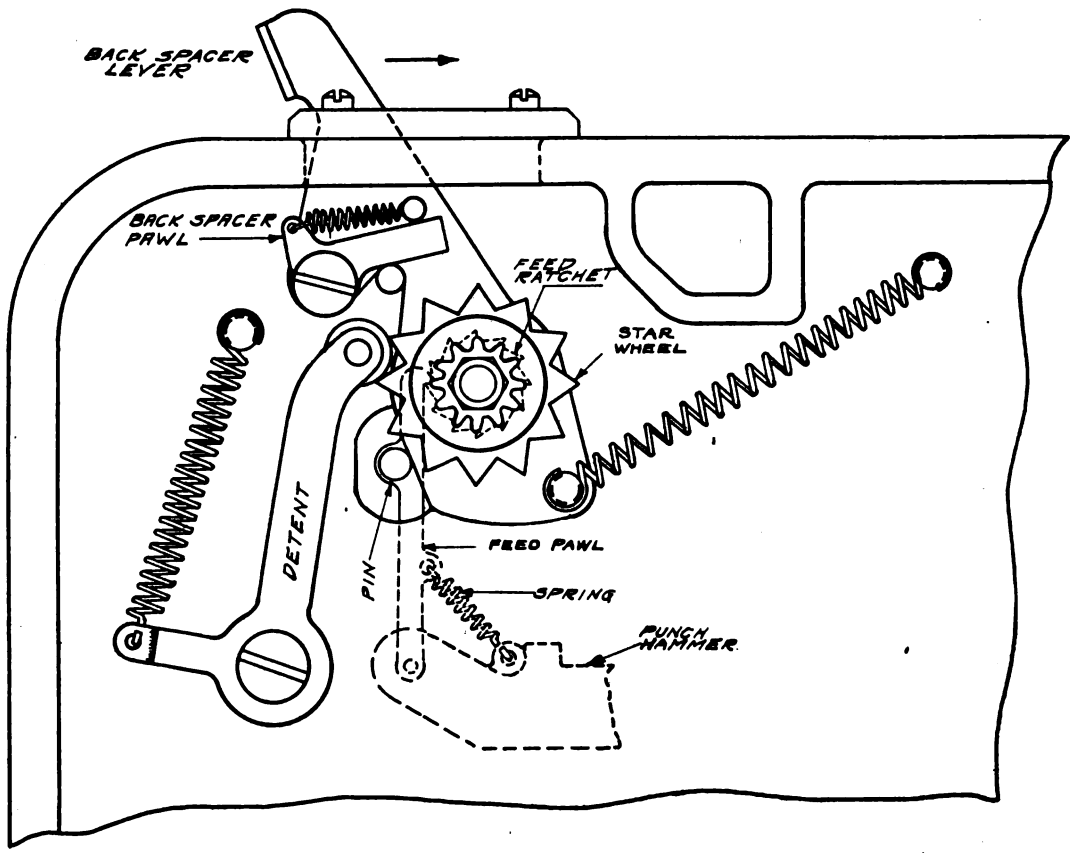


FIGURE 12. BACK SPACING MECHANISM.
(Looking at Perforator from Bottom.)

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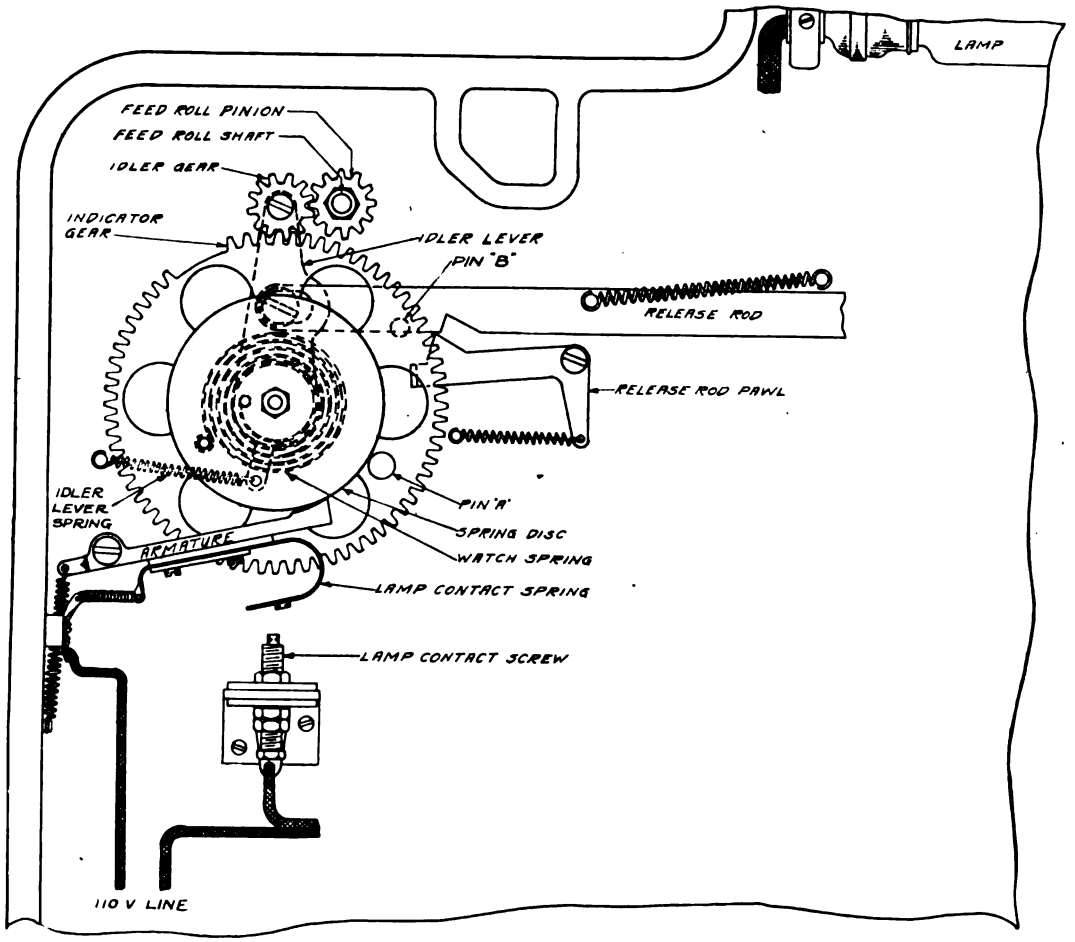


FIGURE 13. INDICATOR MECHANISM.
(Looking at Perforator from Bottom.)

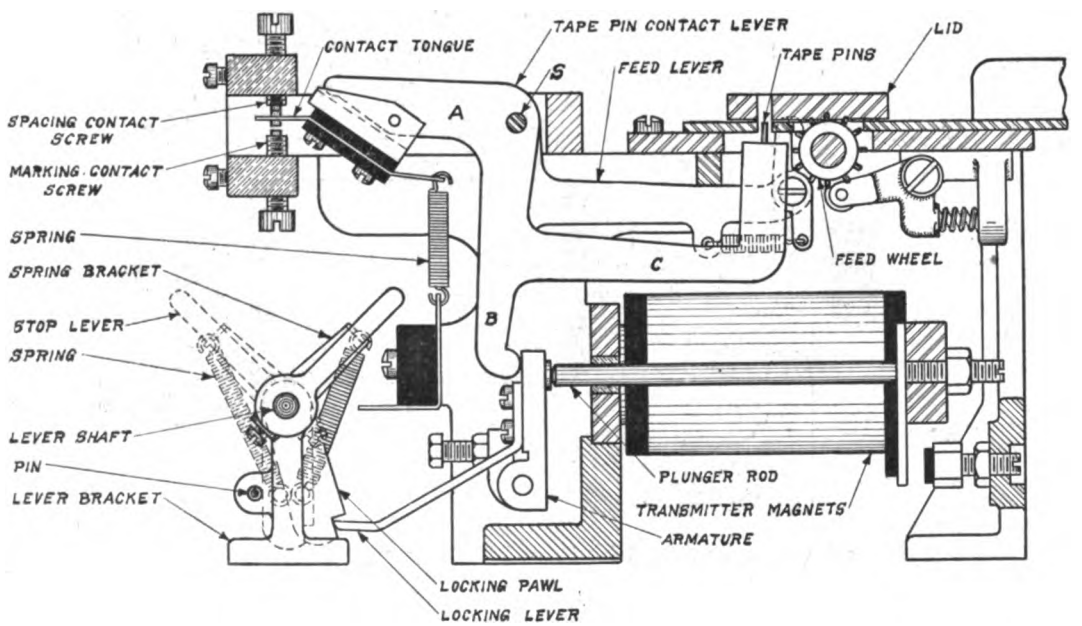


FIGURE 14. FRONT VIEW OF TRANSMITTER.

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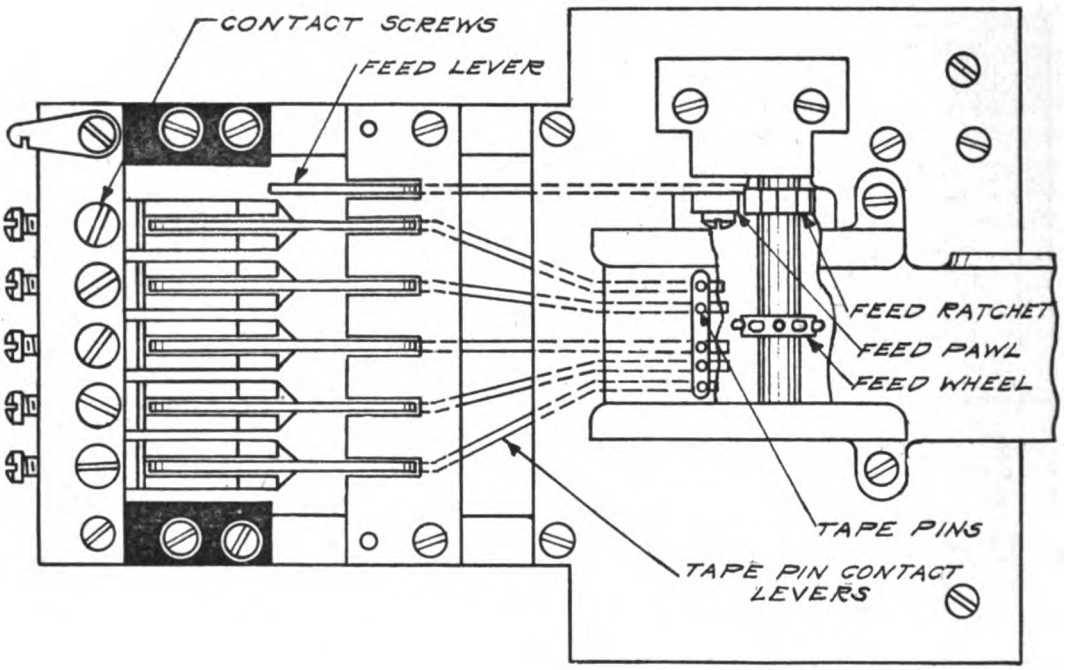


FIGURE 15. TOP VIEW OF TRANSMITTER.

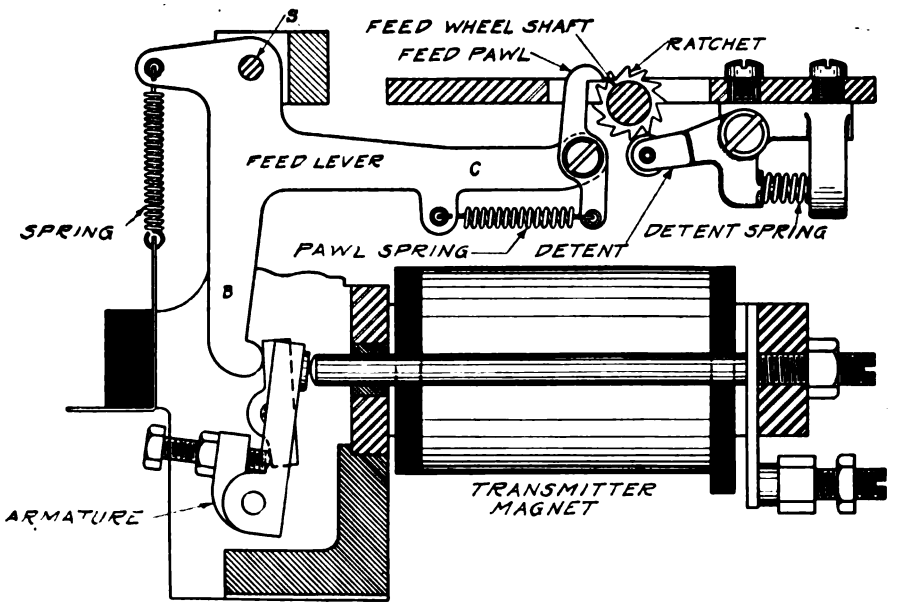


FIGURE 16. FEED MECHANISM.

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one of the auto stop contacts, and the back contact of the auto stop relay, which relay is differentially wound. When the transmitter cam allows the cam contacts to close, battery will flow through the auto stop contacts and the A winding of the auto stop relay, and also through the back contact and tongue of the auto stop relay, and thence through winding B. Since the battery flows through both windings in opposite directions the relay will not operate. The transmitter magnets are connected to the tongue of the auto stop relay, so that battery will also flow through these magnets, causing the operation of the transmitter.

If the auto stop lever is raised, opening the auto stop contacts, the circuit from the transmitter cam contact to winding A of the relay will be opened. Thus, when the transmitter magnet cam again allows its contact to close, battery can flow only through the back contact and tongue, and winding B of the relay. Battery, of course, also flows from the relay tongue to the transmitter magnet, operating the transmitter. Since the B winding of the relay is now not neutralized by the A winding, the relay will operate. The operation of the relay causes the tongue to leave the back contact and press against the front contact which is connected to battery. This battery will flow through the B winding and the transmitter magnets, holding both the relay and the transmitter operated. They will remain in this condition as long as the auto stop contacts are open.

When the auto stop contacts are again closed, winding A will again be connected to the transmitter cam contact, but no current will flow until the cam contacts close. When the cam contacts close, battery will flow through the auto stop contacts and winding A neutralizing the effect of winding B. This will restore the relay to its unoperated position and as soon as the cam contacts open, will de-energize the transmitter magnets.

It should be noted that the auto stop relay and transmitter magnet cannot be operated or released until the five intervals of a combination have been sent over the line, due to the fact that the transmitter magnet cam which controls the operation of the relay and transmitter magnets, does not close the contacts until after the fifth impulse has been transmitted.

The auto stop lever can also be used for manually stopping the transmitter. If the lever is lifted high enough, a spring clip mounted on the auto stop bracket, engages the lever and holds the auto stop contacts open.

*Stop and Start Mechanism.*—A mechanical means is also provided for stopping the transmitter when not in use. Referring to Figure 18, the stop lever is attached to a shaft which passes through a journal in the lever bracket. Attached to the other end of this shaft is a spring bracket, and fitting loosely on the shaft between the spring bracket and the journal is the locking pawl. One end of a spring is attached to the lower end of the locking pawl, the other end being attached to the spring bracket. When the transmitter is operating, the stop lever is thrown to the left, and the locking pawl assumes a position against the pin at the left of the bracket.

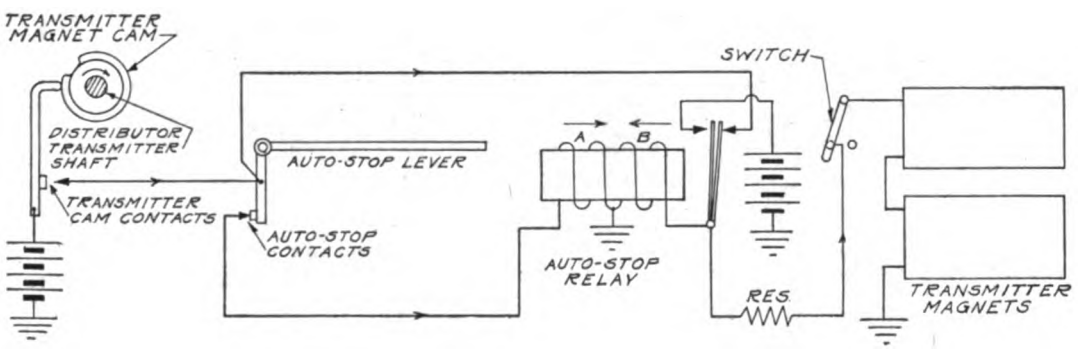


FIGURE 17. TRANSMITTER MAGNET AND AUTO STOP CIRCUITS.

When the stop lever is thrown to the right, the locking pawl, due to the action of the spring, also moves to the right and presses against the locking lever which is attached to the transmitter magnet armature. When the magnet operates, the movement of the armature causes the end of the locking lever, against which the locking pawl is pressing, to move downward. In so doing the end of of the locking lever slips into a notch in the locking pawl. This holds the armature in an operated position with tape pins below the top plate, and all the contact tongues against their spacing contacts.

If it is now desired to start the transmitter, the stop lever is thrown to the left. The spring attached to the locking pawl tends to move it to the left also, but the pressure of the locking lever, which is held in the notch of the pawl, prevents this movement. When the transmitter magnet operates, the locking lever is moved slightly downward, relieving this pressure, which allows the spring to move the locking pawl out of engagement with the locking lever.

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It is to be noted that when the transmitter is stopped by either the auto stop or mechanical stop, that the armature is held in its operated position, and the transmitter tongues against their spacing contacts. Thus, all-spacing or "blank" signals will be sent over the line which will have no effect upon the distant printer.

There is a switch in the base of the transmitter, the operation of which opens or closes the circuit of the transmitter magnets. If the transmitter is stopped by opening this switch, the tape pins will be in their upper position, and if there is no tape in the transmitter the all-marking or "letters" signal will be sent to the line continuously. If there is tape in the transmitter when the switch is opened, that lower or marking contact screws. The tape pin contact levers corresponding to the pins which have not passed through the tape will not move, so that their contact tongues will remain against the upper or spacing contract screws.

Each of the five contact tongues is connected to a segment on the transmitter commutator. Each segment will, therefore, be given the polarity corresponding to that of the contact screw against which the contact tongue connected to the segment is resting. In the above case segment 1 will be negative, segments 2 and 3 positive, and segments 4 and 5 negative.

The transmitter brush passes over the segments

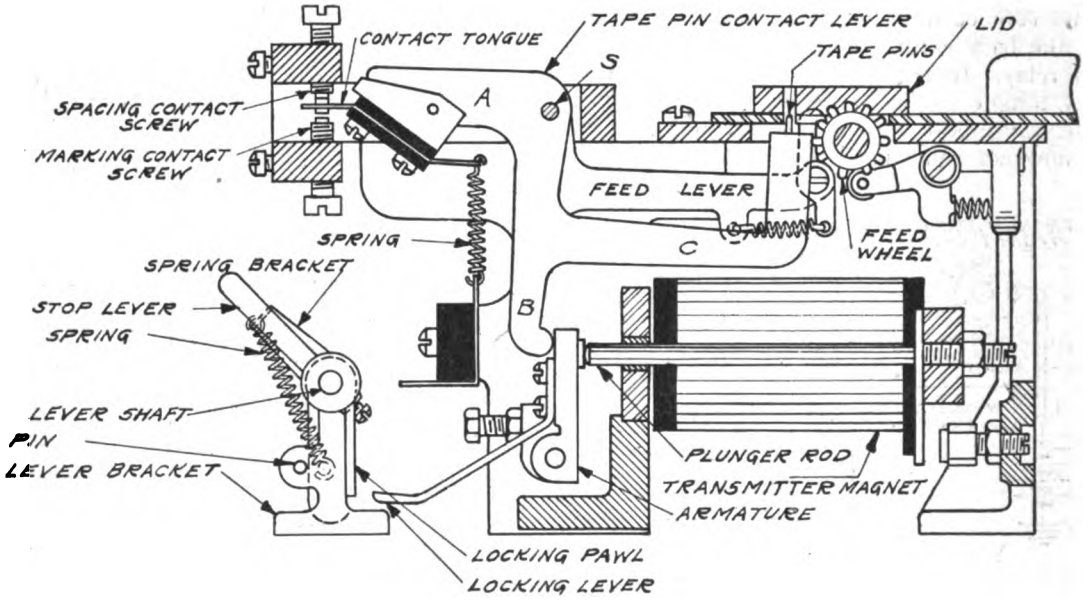


FIGURE 18. STOP AND START MECHANISM.

combination which is in position above the pins will be sent to the line continuously.

If the transmitter is to remain idle for a long period of time it is well to throw the mechanical stop lever to the stop position, and then open the switch to prevent the magnet heating.

Reviewing the operation of the transmitter: Assuming that we have the combination — + + — — which corresponds to the letter B, we have the following sequence of operations:

The tape for the above combination will have perforations corresponding to the first, fourth and fifth tape pins. The first, fourth and fifth pins will pass through these perforations, while the second and third pins will be held down by the tape. The tape pin contact levers corresponding to the pins which have passed through the tape will move their contact tongues downward, making contact with the successively, sending impulses over the line corresponding to the polarity of the segments, — + + — — in this case.

At the end of the fifth code impulse, the transmitter magnet cam will allow the circuit through the magnet to be closed, thus operating the magnet. The transmitter magnet plunger will move forward against the pivoted armature, which will first pull down the tape pins which are projecting through the tape, and then engage the feed pawl with the ratchet causing the tape to move over so that the perforations for the next combination are directly above the pins.

By this time the transmitter magnet operating cam will have revolved far enough to open the transmitter magnet circuit. This will de-energize the magnet and enable the armature to fall back and allow the pins to take their positions in the tape for the next combination.

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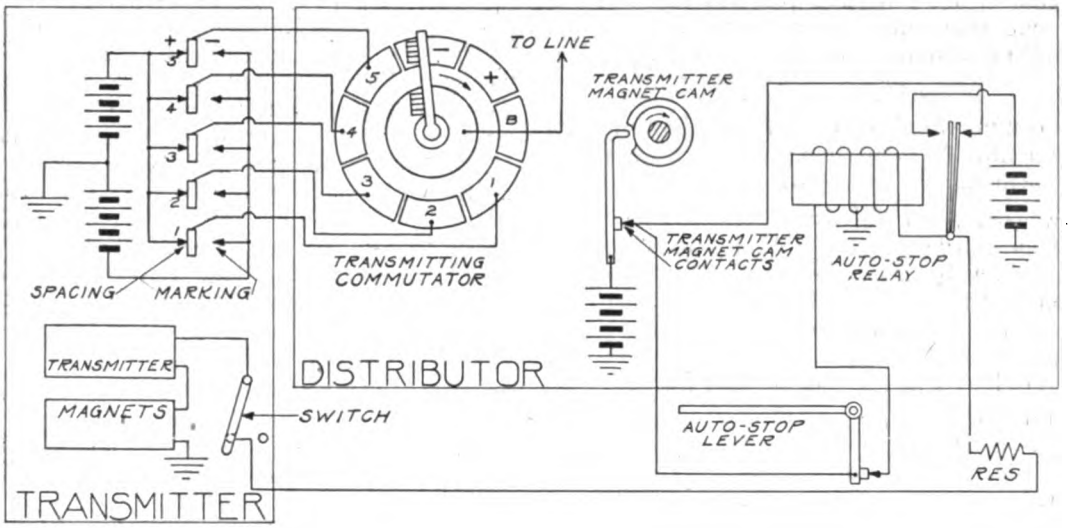


FIGURE 19. THEORETICAL TRANSMITTER CIRCUITS.

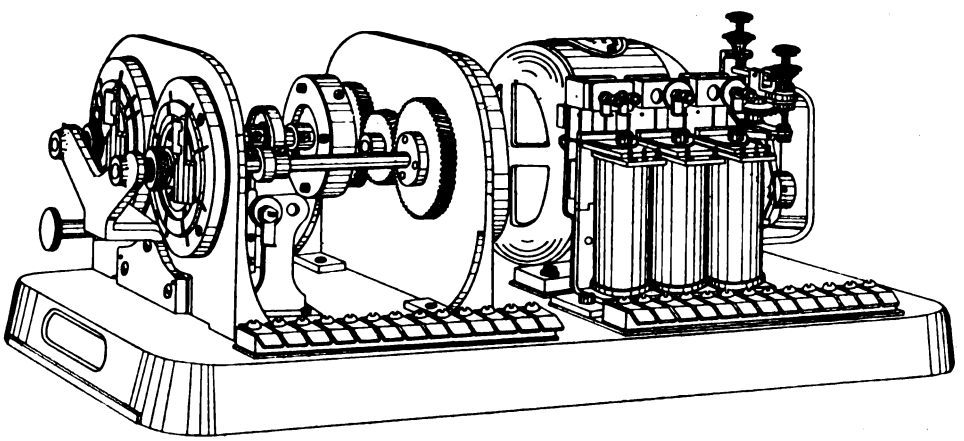

FIGURE 20. MORKRUM DISTRIBUTOR.

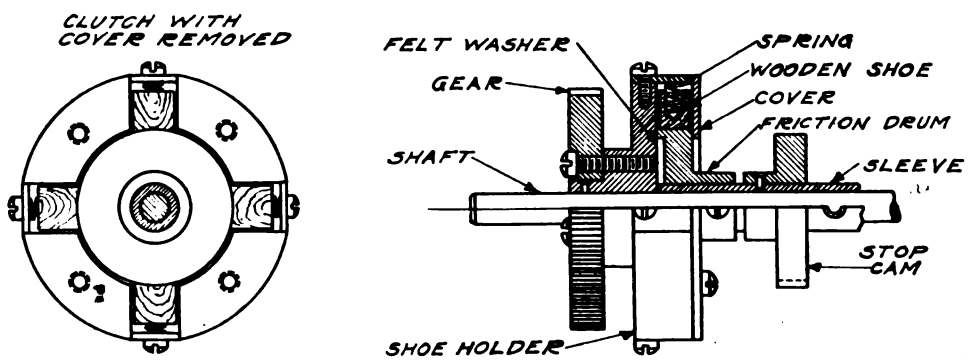


FIGURE 21. FRICTION CLUTCH AND STOP CAM.

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DISTRIBUTOR.

Since the Morkrum system is operated duplex, that is, signals are sent and received at the same time on one wire, there is required at each end a transmitting commutator and a receiving commutator.

These commutators with their brushes, driving shafts and attendant mechanism are embodied in an instrument known as a distributor.

The two shafts which carry the receiving brush and the transmitting brush are, by means of a train of gears, driven by the same motor. The receiver shaft is geared to run approximately eight per cent faster than the transmitter shaft. That is, if the transmitter shaft be revolving at 360 R. P. M., the receiver shaft will revolve 390 R. P. M.

The transmitter brush is rigidly fixed to the transmitter shaft, but the receiver brush is fixed to a loose sleeve upon the receiver shaft, and this shaft drives the sleeve through the medium of a friction clutch.

*Friction Clutch.*—The receiver brush is attached to one end of this sleeve, through which the receiver shaft passes, while a friction drum is secured to the other end (Figure 21). This friction drum is enclosed in a metal box known as the shoe holder.

The shoe holder is a round block of metal which has been hollowed out. At equidistant points on its circumference four radial slots are cut through its rim. Pieces of wood are placed in these slots and by means of springs these pieces of wood, or friction shoes are made to press against the enclosed friction drum. The springs are constrained between the shoes and four small plates which are held by screws in the outer rim of the shoe holder, in such positions that they cover the outer ends of the four radial slots.

A round plate or cover is screwed to the front of the shoe holder and prevents the shoes from coming out of their slots.

The shoe holder is pinned to the receiver shaft and attached to the back of the shoe holder is a gear which meshes with the other gears of the train driven by the motor.

*(To be continued.)*

## Telegraph and Telephone Extensions in New Zealand.

During the fiscal year ended March 31, 1918, there was expended on telegraph and telephone extension in New Zealand $570,670, as compared with $989,413, for the previous fiscal year. During the fiscal year 1918 there were 683 miles of wire strung and 121 miles of poles set; and greater extensions are contemplated by this Department for 1919.

There were 12,330 miles of wire added to the telephone exchange plants in the Dominion during the fiscal year, and 13 new exchanges opened during the year, with additional accommodation added in 28 others; additional exchange connections for the year amounted to 4,940. During the year 26 new coin-in-the-slot telephones were installed, making a total of 263 telephone slot machines for the Dominion at the close of the year with extensive plans for extension of the automatic telephone instalation in this Dominion for 1919. Two cents put in the slot machines in the public booths located at convenient parts of the city, either on or adjoining the sidewalk, will put the lines in service for five minutes.

THE NATIONAL BELL TELEPHONE COMPANY was organized March 13, 1879, with a capital of $850,000, taking over the New England Telephone Company and the Bell Telephone Company. On March 19, 1880, the American Bell Telephone Company was organized, with a capital of $10,000,000. In December, 1899, the property was transferred to the American Telephone and Telegraph Company.

## Copper.

As there are many persons interested in the copper market who may not be familiar with the various terms employed, we give below a summary of the usual copper standards:

LAKE: Copper from the native copper mines of the Lake Superior district. The standard range of conductivity is 99.5%.

ELECTROLYTIC: Copper refined by the electrolytic process and running 99.93% upwards for cathodes. Conductivity to 103%.

CASTING: Copper analyzing 99 to 99.75% made from ore and scrap. Used for casting purposes.

BEST SELECTED: British copper averaging 99.75% fine. Largely used in the British brass trades.

TOUGH: British copper largely used for casting, rolling, and drawing. Runs about 99.25% copper.

CHILI BARS: Copper smelted in Chili running 95 to 99% copper; in some cases carrying bullion.

STANDARD: Practically anything running from 95% copper upwards, dealt in on London Metal Exchange.

MATTE: A semi-metallic compound made from ores and usually running rom 25 to 55% copper. An intermediate product between the ore and the finished copper.

The following are the published prices for the month:

| | Lake | Electrolytic |
|---|---|---|
| High ..... | 23⅛c | 22⅜c |
| Low ..... | 21¾c | 21½c |
| Closing ..... | 21¾c | 21½c |

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## The Problem of Knowledge.

BY F. E. D'HUMY.

Your worthy editor has asked me to contribute one of a series of articles which are appearing in these pages, for the purpose of suggesting to managers and chiefs the desirability of broadening their viewpoints by means of a course of reading and study. In complying, I realiize how well this subject has been covered, from time to time, by telegraph men especially well fitted to understand it, and in consequence feel that, perhaps, I may be of the most assistance if, instead of dealing directly with the subject, I touch upon some of those principles which, when brought to mind, may stimulate desires and understandings as to the best course to follow.

It is the especial prerogative of man to be the ruler of his environment. What is true of the genus, is inherent in the individual. Each individual, therefore, possesses the potentials which serve to give him complete control over self and environment. When such control does not obtain, it is because those powers with which he is endowed are not properly exercised. To bring them to the front is not always easy. A few are able to do this early in life, while in others it lies dormant throughout their lives. The latter instances are no doubt due to the even tenor of the individual existence led, in which little or nothing occurs to stir those latent gifts from their resting places. These persons are usually content to be carried along by the easy tide of our social system, and permit a comparatively few members to guide its destiny by the exercise of those attributes with which all have been endowed by Providence.

Those who are able, and do use the control given them, often have little or no understanding of the fundamentals which endow them with the inherent faculties referred to. The exigencies of their individual lives have brought them into natural activity, and thus these members become the leaders of our corporate existence more or less unconsciously. Those of you who may be seeking to develop yourselves in order that you may improve your leadership, have in this impulse, alone, already gained an important advance, for to aspire is also an attribute which is inherent in every individual and only too frequently lies latent in many. It also is stimulated into activity by circumstances, and in reality forms the initial impulse to rule one's own destiny and guide that of others.

If you will recognize the existence of the fundamentals alluded to, and understand them clearly and so intimately that you become ever conscious of the power which you inherit, you will most assuredly be better prepared to guide your own training in the channels best suited to your environment, than would be possible without such understanding. Having progressed thus far, you are in a position to improve yourself at will and master your own destiny. You will cease to think at random, if that was your habit before, and direct your mind to work in an orderly and consecutive manner. You will discover that through adverse thinking, undesirable conditions will arise, while on the other hand, wholesome thinking will bring harmony, happiness and success. As a result of this discovery, it will be within your own volition to become master of yourself, for you will have learned, from your own experience, to choose between right and wrong thinking.

In pursuing further your search for channels of improvement, you will discover the importance of harmony. You will grow to recognize that it forms the base on which all good construction is built and that when harmony is absent, destruction is in process. Complete harmony cannot exist, so far as you are concerned, unless your thoughts are right. They must bear the right attitude to yourself and to everything and everybody you meet. Do not overlook the fact that you cannot pursue your course in life alone, every motive and action which is seemingly your own, is interminably tied in with your environment. Your work is not individual; it is part of a collective effort. It is, therefore, obvious that if you desire to make all your efforts possess a plus value in this world's work, you must be in harmony with yourself and all others and all things. To be on good terms with the other fellow, is not necessarily to be in harmony with him; do not be misguided by such a belief. You are not in harmony with others until you can actually work with them constructively. That difficulties seemingly enter the path to harmony, is true. Some of us may believe it impossible to get along with certain persons. We may consider them irritating and blame them for one fault or another. In such cases, it is quite likely that you are at least partly responsible, and that if you will change your mental attitude from one of antagonism to one of sympathy, you will find a remarkable transition taking place. The change will be unmistakaby real if you are sincere in your purpose. The process may be a long one and many impediments may present themselves, but do not forget that you unqualifiedly possess the power to master any situation, no matter who you are or how difficult that situation may appear. All you have to do is to exercise the prerogatives that are yours by nature, and harmonize conditions, one by one. If you will persevere in this you will find that the habit of correct thinking will be gradually formed. It will become easy to guide the work of your subordinates, co-operate with your associates and give satisfaction to your superiors. Those who come under your influence will improve with you. The selection of subjects for study as an aid to further improvement will not be difficult, as the subjects will suggest themselves as you need them and are ready to take them up.

Remember the tremendous power that is in you! Remember that harmony is essential to all accomplishments and that sympathy must always be present for harmony to exist.

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# Electro-Physics for the Telegraph, Telephone and Radio Student

No. 17

## Telephone Transmission.

### INTERFERENCE.

As stated in the previous article, even a small induced current may cause a loss in transmission equal to the loss in several miles of cable. This refers to induced currents in wires carried on pole lines.

It is possible to determine experimentally the effect of induced current interference in terms of standard cable measurement; that is, as to the length of cable which would adversely affect transmission to the same extent. Obviously, high frequency induction interferes to a greater extent than induced currents of low frequency. It is easy to understand that if the induced current has a frequency of, say one cycle per second, that the interference would be negligible.

A standard circuit 116 miles long and free from induced currents will have a transmission efficiency equal to a standard circuit 100 miles long which has impressed on it an induced current of 10 microamperes at a frequency of 300 cycles.

From the foregoing, it is plain that the factor of interference is important in a similar sense as are the factors of attenuation and distortion.

It is common practice, especially in railroad service, to use the side circuits of phantom arrangements for telephone train dispatching and message traffic, and to use the phantoms as circuits for conversation.

The transmission equivalent of non-loaded copper wire line, when the line insulation between conductors is higher than 32 megohms per mile, is as follows:

| | *Pairs* | *Phantoms* |
|---|---|---|
| No. 14 N.B.S.G. Copper | .122 | .105 |
| No. 12 N.B.S.G. Copper | .079 | .067 |
| No. 8 B.W.G. Copper | .035 | .029 |

The equivalents are in miles of standard cable.

### TRANSPOSITION.

The transposition of a pair of wires or of the side circuit of a phantom requires that the pin positions of the two wires be interchanged on cross-arms. This is accomplished by bringing one wire to the insulator on the cross-arm pin in the regular manner, the other wire of the pair being attached to an insulator supported by a pair-transposition bracket. The wires then are carried to the next pole and are given reversed positions. This is single-circuit transposition.

What are known as horizontal phantom transpositions are made up by bringing each of the four wires to separate insulator attachments on a phantom transposition bracket; that is, where the phantoms are made up of adjacent wires on the same cross-arm. The type of bracket used holds one insulator above the cross-arm and two insulators below the cross-arm.

When phantoms are made up of circuits on adjacent cross-arms no special bracket is required. The wires may be brought to intermediate positions on the arms of one pole, and then to the desired positions on the corresponding cross-arm of the next pole. This is termed vertical phantom transposition.

With reference to cross-talk between a phantom and its two side circuits, it is important that not only should the wires be properly transposed as to exposure to each other, but that telephones bridged across the sides be located at neutral points in the transposition scheme; also, it is necessary that the wires making up the side circuits be accurately balanced electrically in regard to their series resistances, and in regard to insulation unbalances or capacity unbalances between the two wires of the pair and ground. Cross-talk between phantom circuit and side circuits will result with an unbalance in resistance of less than twenty ohms between the two wires making up a side circuit, and for this reason it is of the greatest importance that linemen and others who work with circuits understand that contacts, joints and other connections, when made, must not add to the resistance of a circuit.

The purpose of transposition, it should be remembered, is to balance out inductive interference, which otherwise would cause much difficulty because of so-called cross-talk from one telephone circuit to another. It is true, also, that untransposed telephone circuits are subject to inductive disturbances originating in nearby telegraph circuits and neighboring power systems.

The most common transposition systems have a unit length of eight miles, and for long lines this is satisfactory, but to meet special cases transposition schemes have been worked out for sections as short as eight pole spans and as long as twelve miles. Generally, the special cases include meeting conditions near terminal offices, and where lines are erected in the vicinity of electric power lines.

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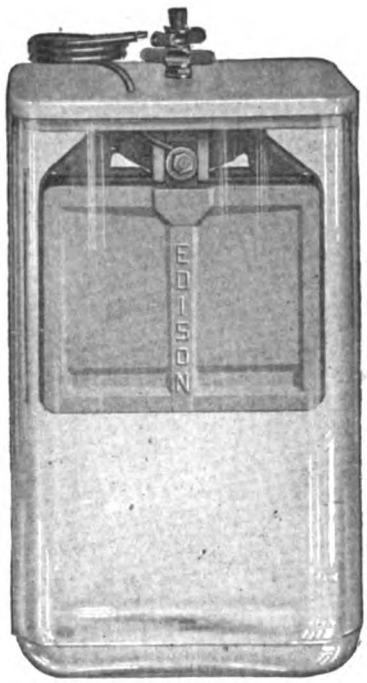
# FOR CLEAR TRANSMISSION

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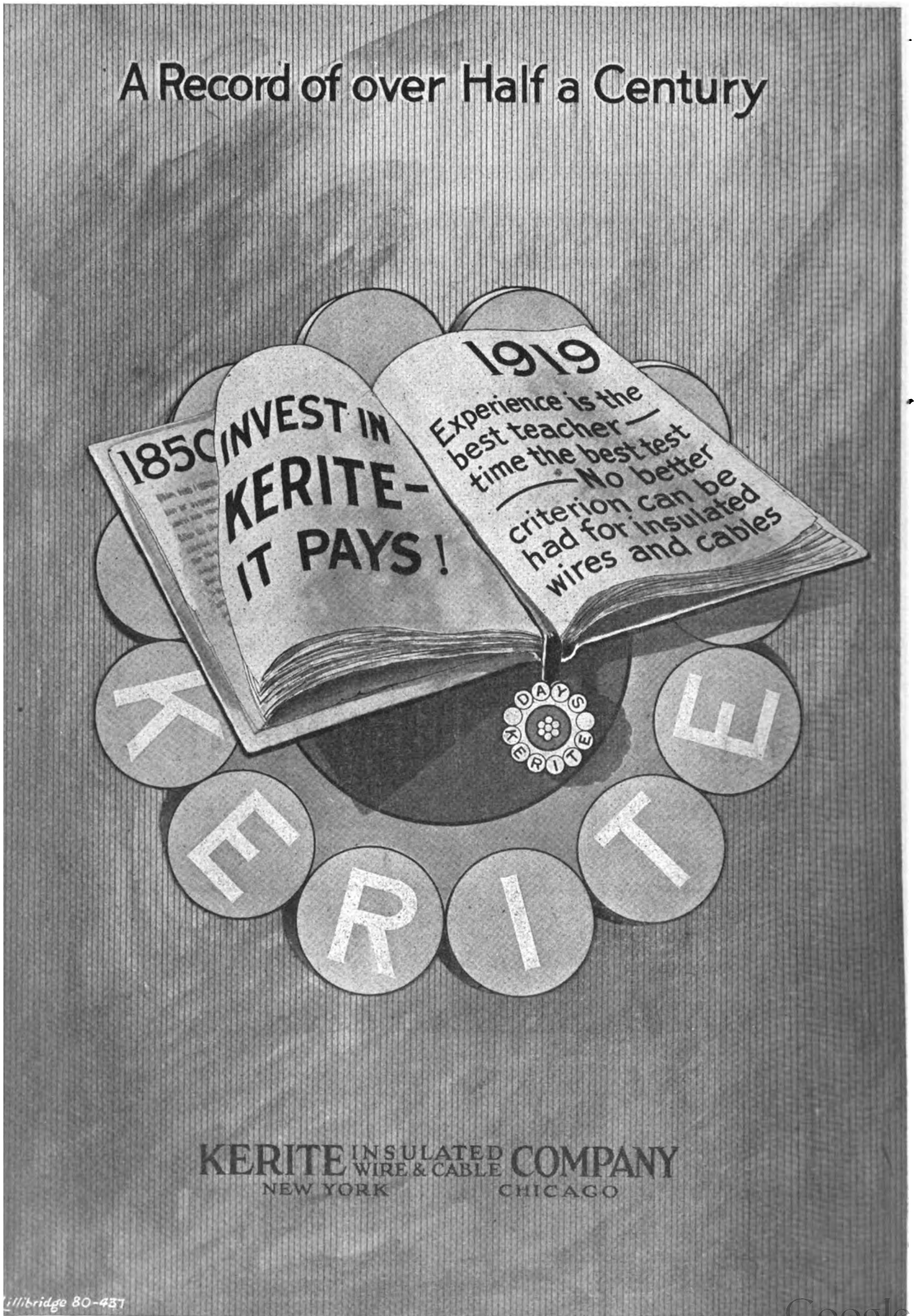
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# THE RAILROAD
## TELEGRAPH AND TELEPHONE

AT THE MEETING of the Committee of Direction, Telegraph and Telephone Division, held on October 16-17, a committee was appointed to handle the subject of Inductive Interference. E. L. King was appointed chairman of this committee.

H. HULATT, first vice-chairman of the Telegraph and Telephone Division, has been appointed a member of the General Committee, Operating Section, American Railroad Association.

J. A. JONES, superintendent of telegraph, Southern Railroad, Charlotte, N. C., was a New York business visitor on October 31. Mr. Jones has introduced on his lines a system of technical examinations for operators and wire chiefs. Already the benefits of this study are apparent both to the men and to the company.

B. O. BENJAMIN, telegraph construction foreman, Northern Pacific Railroad, has resumed his duties after a leave of absence on account of ill health. Mr. Benjamin recuperated in Alaska.

S. H. MENAGH has been appointed assistant superintendent of telegraph, Erie Railroad Company at Marion. Ohio. Mr. Menagh saw service with the United States Signal Corps in France.

WESLEY ALEXANDER TAYLOR, telegrapher in the service of the Canadian Pacific Railway Company, and who participated actively in the war operations in France, has been awarded the Military Medal, by King George of Great Britain. The same decoration has been awarded to Clarence S. Hewitt, a C. P. R. telegrapher. The citations accompanying the medals state that the awards have been made "for bravery, gallantry and devotion to duty in the field."

THE NAMES of Norton William Glenn, telegrapher at Winnipeg, Man., and Edward Staves, lineman at Strathmore, Alta., both in the service of the Canadian Pacific Railway Company's telegraphs, have been added to the company's Honor Roll, in recognition of their participation in military activities during the late war.

L. T. SCHULER has been appointed chief clerk to R. F. Finley, superintendent of telegraph, New York Central Railroad, Cleveland, Ohio, succeeding K. F. Chaney, resigned. Mr. Schuler has been acting as assistant chief clerk in the same office for some time past.

### Chicago, Rock Island and Pacific Railroad.

A. W. DOUGLAS, assistant superintendent of telegraph, has returned to duty after recovering from an operation for appendicitis.

R. W. POTTS, assistant superintendent of telegraph, has resigned from the service in order to devote his time to the development of oil properties in which he is interested in California.

F. H. KAHL, formerly superintendent of telegraph, Chicago, Rock Island and Gulf Railroad, has been appointed telegraph traffic supervisor of the C. R. I. and P. Railway, with headquarters in Chicago.

A. B. DICKEN has been appointed telegraph and telephone inspector, with headquarters at Topeka, Kan.

GEORGE J. JOHLER has been appointed chief clerk to the superintendent of telegraph, Chicago.

### Baltimore and Ohio Railroad.

CALEB H. HACKETT, aged seventy-four years, died near Morgans, Md., September 22. Interment was at Baltimore, Setember 24. Mr. Hackett had been connected with the office of the superintendent of telegraph as expert wireman for many years, and had been an employee of the company continously during the past fifty-six years.

J. CLINTON SMITH, sixty-five years of age, for many years operator, dispatcher and chief dispatcher of the Shenandoah Division, died on September 21 at Winchester, Va. He was placed on the retired list one year ago.

R. K. HALL, returned after a year's service as radio operator in United States Signal Corps service in France, has resumed his position as telegrapher at Washington Court House, Ohio.

GEORGE J. PARK, operator, has been appointed to a position in the train dispatcher's office at Garrett, Ind.

S. M. DE HUFF is manager of the telegraph office at Connellsville, Pa.

### Southern Pacific Railroad.

H. H. COOPER, manager of the main telegraph office at Los Angeles, is on his vacation, being relieved by J. A. Hage, printer mechanician. R. E. Steere is relieving Mr. Hage on the printers.

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HARRY WALTERS has been assigned to the Coast dispatching trick, and has been relieved in the telegraph office by W. A. Troutman.

JERRY FOSTER, relief dispatcher, has been granted a year's leave of absence, and is relieved by Frank Ellison.

S. R. WILLIS, W. C. Herring, Thomas B. Cahoe, T. F. Gray and John Fitzpatrick, operators, are absent on vacation.

### Missouri, Kansas and Texas Railroad System.

W. H. HALL, superintendent of telegraph, attended the meeting in New York, October 16 and 17, of the Telegraph and Telephone Division, American Railroad Association.

A NUMBER of very interesting meetings have been held among telegraph department employees recently. On October 4, a circuit managers' meeting was held in the office of superintendent of telegraph at Denison, at which time numerous topics of interest were discussed.

A GANG has been organized for the purpose of making repairs on the Missouri, Oklahoma and Gulf Railroad and work between Denison and Muskogee was started on October 27.

MR. C. E. PARRY, who has been employed in the capacity of equipment supervisor, has resigned to accept the position of equipment engineer of the Southwestern Bell Telephone Company for the state of Missouri, with headquarters in St. Louis. Mr. Parry will first go to Chicago where he will make a special study of the automatic telephone, after which he will return to St. Louis to take up his new duties.

W. A. COOPER, who has been connected with the telegraph department for the past thirty years, has resigned to engage in private business. Mr. Cooper is an old and faithful employee, and it is with deep regret that his many friends and coworkers see him leave.

### Fewer Women Employees.

The number of women employed on the railroads under federal control on July 1, 1919, had decreased 17,415, or 17.4 per cent, as compared with January 1.

Because of the heavy character of the work, instructions are outstanding that women shall not be employed in depot parcel rooms, as section laborers or as truckers.

Following is a statement of the numbers engaged in various capacities:

| Service | Jan. 1 | July 1 | Pct. Dec. |
|---|---|---|---|
| Clerical ..... | 74,744 | 64,602 | 13.6 |
| Messenger service . | 754 | 562 | 25.5 |
| Signal service ..... | 234 | 138 | 41.0 |
| Station agents, etc. . | 1,174 | 1,134 | 3.5 |
| Telegraph operators | 2,587 | 1,768 | 31.7 |
| Telephone operators | 2,282 | 1,577 | 35.3 |

### Convention of the Telegraph and Telephone Division, American Railroad Association, To Be Held in Chicago, December 3, 4 and 5.

The meeting of the Telegraph and Telephone Division of the American Railroad Association to be held in Chicago December 3, 4 and 5, will be the second gathering of the railroad telegraph superintendents of the United States and Canada since the old Association of Railroad Telegraph Superintendents was reorganized in June last as a Division of the American Railroad Association.

The first chairman of the Division was Martin H. Clapp, manager of the Telegraph Section of the Railroad Administration. Mr. Clapp also was the last president of the old association which had been in existence since 1884.

At a meeting of the Committee of Direction of the Telegraph and Telephone Division, American Railroad Association, held in New York, October 15, 16 and 17, 1919, Mr. Clapp tendered his resignation as chairman, and J. F. Caskey, superintendent of telegraph, Lehigh Valley Railroad, and first vice-chairman of the Division, was elected to succeed Mr. Clapp as chairman. H. Hulatt, manager of telegraphs, Grand Trunk and Grand Trunk Pacific Railroads, and second vice-chairman of the Division was elected first vice-chairman to succeed Mr. Caskey, and W. H. Hall, superintendent of telegraph, Missouri, Kansas & Texas Railroad System. was elected second vice-chairman to succeed Mr. Hulatt.

The Chicago meeting in December is to be held in the Florentine Room of the Congress Hotel. The Committee of Direction will hold its first session of the meeting at 11 a. m., December 2.

Chairman Caskey advises that Committee No. 1, Construction and Maintenance, Outside Plant, G. A. Cellar, chairman, will submit its report covering recommendations adopted at various meetings held during the past six months—since the June convention held in Chicago.

Also a report will be submitted by sub-committee "B" — Wire Crossings — E. C. Keenan, chairman. The lively discussion brought out at the June meeting relating to this subject, suggests that the committee's further report will be awaited with no little interest by the members of the Division.

Sub-committee "D" — "Transpositions" — Robert E. Chetwood, chairman, will make some additional recommendations for consideration by the Division. In connection with this sub-committee's activities it should be noted that at the November meeting of the Committee of Direction held in New York in November a new committee was appointed to take in hand the subject of "Inductive Interference" E. L. King, superintendent of telegraph. Southern Pacific Railroad, San Francisco, was appointed chairman of this new committee.

Committee No. 2—Construction and Maintenance. Inside Plant, R. F. Finley, chairman, has prepared

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for presentation to the meeting a complete and voluminous report. At a meeting of this committee held in Cleveland, Ohio, September 29 and 30, consideration was given to the character of report to be presented, and as there was a full attendance of the members of the committee at the meeting, the report is expected to be of positive value.

Committee No. 4—Protection Against Lightning or Electric Light and Power Circuits—I. C. Forshee, chairman, reports that the work in hand has progressed favorably during the past six months, and that at the Chicago meeting the matter to be submitted will show constructive advancement.

Committee No. 5—Telegraph and Telephone Development—J. A. Jones, chairman, will have a very complete and interesting report to present to the meeting. Mr. Jones has, during the past six months, given the entire subject close attention, and in his efforts to gather valuable data and information, he has been ably assisted by the members of his committee. In connection with the report of this committee, Mr. Caskey, the new chairman of the Division, advises that he has arranged with the Morkrum Company of Chicago for an exhibit and demonstration of the company's recently developed printing telegraph system known as The Teletype.

Committee No. 6—Message Traffic—H. Hulatt, chairman, has during the past six months held a number of meetings, and the report to be presented at the Chicago meeting will contain proposals of the greatest importance to railroad telegraph executives. This subject is one which for many years was badly neglected, and it is particularly fortunate that the committee appointed to go into the subject is made up of superintendents who had already given the subject individual consideration. The committee's report will be presented on the last day of the meeting, December 5, and it is likely that the bulk of the day will be devoted to consideration and discussion of the report.

Committee No. 3—Electrolysis—W. E. Bennett, chairman, will have an interesting report to present to the meeting, and those who have studied the committee's report as published in the Proceedings of the Chicago, June meeting, will be interested in the committee's progress report.

A tentative program has been outlined providing for a meeting of the Division to be held in St. Louis, Mo., in March 1920, and for the annual meeting to be held in Winnipeg, Man., in June 1920.

The special committee having in charge the making of arrangements for service and accomodations at the Chicago meeting consists of Messrs. G. A. Cellar, W. E. Bennett, and F. T. Wilbur.

B. A. Kaiser, chairman of the entertainment committee, Telegraph and Telephone Appliance Association, states that the Association will be represented at the Chicago meeting and that plans are under way for providing entertainment.

Chairman J. F. Caskey, calls attention to the fact that although the meeting is, in a sense, special, that the great importance of the reports to be presented makes it imperative that all members of the Division do everything possible to be present. The constructive work the Division is engaged in can be a national success only if members from all parts of the country attend the meetings and participate actively in the discussions.

### The Gravity of a Question.

The Wichita, Kan., *Eagle*, in a recent issue, had an item which read as follows:

"Wichita women, as a rule, are good baseball fans, the *Eagle* asserts, but there is one girl at the Western Union offices who should buy a book of rules and brush up a bit. Recently the sport editor of the *Eagle* called up the Western Union to make inquiry concerning the batteries in the game between Tulsa and Wichita. Imagine his surprise when the young woman told him he'd have to wait until the chief electrician returned to find out about the bateries."

There is no likelihood, however, that anyone will succeed in forming a winning baseball team by signing up a couple of old dry-cells.

### "A Little Knowledge."

An operator in a country office was recounting to a few village friends gathered around the depot stove how he had poked 3,000 words of Press into the New York *Sun* office the night the President's special left town.

One of the group asked him if he had sent his fastest gait.

"Oh, no!" he said, "I only hit up a speed of about forty ohms.

### The Western Union Multiplex.

The Western Union multiplex system is completely described in a neat pamphlet published by TELEGRAPH AND TELEPHONE AGE. The description of the system has been revised and brought up to date and the work is fully illustrated with views of the different pieces of apparatus. It was gotten up primarily as an appendix to Jones' Pocket Edition of Diagrams and Complete Information for Telegraph Engineers and Students, but some copies have been bound separately for the use of those who wish to carry it apart from the parent book as a matter of convenience. The booklet is the same size as the Jones' book, and can therefore be easily carried in a coat pocket. It will be found very serviceable to those who are studying the multiplex. The price of the pamphlet is 35 cents per copy. Send orders to TELEGRAPH AND TELEPHONE AGE, J. B. Taltavall, publisher, 253 Broadway, New York.

NEVER KICK a live wire when it is down.

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# QUESTIONS AND ANSWERS

### Current and Voltage Transformers.

F. H. L.—The terms "voltage" and "current," when used to designate types of transformers, refer to electrical design rather than mechanical design. A *voltage* transformer is essentially a lighting or power transformer of small capacity used to step down the line voltage for the operation of instruments. The rated output of the transformer is generally made considerably less than the output which could safely be carried without overheating; this limitation of the output is for the purpose of limiting the variation of the ratio of transformation without change of output. The term "potential transformer" has been in use since the beginning of the alternating current art. However, as the word "potential," when used in this sense, is incorrect unless assumed to be a contraction of "potential-difference," and has been used in other senses in scientific work, it is suggested that the expression "voltage transformer" be used instead, as it is not ambiguous.

The ratio of transformation of a voltage transformer is the quotient of the voltage applied to the primary terminals divided by the voltage available at the secondary terminals. The ratio of transformation is a variable quantity, and while it is nearly equal to the quotient of primary turns divided by secondary turns, it should be distinguished from the ratio of turns.

The *current* transformer does not differ in principle from ordinary lighting and power transformers, but it is rather sharply limited as to design, if good results are to be secured. The magnetic induction must be kept low, and the core is preferably of silicon steel. The magnetic circuit should be short and have interlaced joints, if joints are present. The number of ampere-turns should be not less than 300, as a rule. This value refers to the rated maximum current.

In the voltage transformer, the thing of importance is the voltage; the primary voltage may be very great while the currents are small. In the current transformer the reverse is true; the voltages are small and are not recorded or used, while the currents are important and the primary current may be very large.

### Postal Quadruplex System.

A. N. K.—The Postal Telegraph-Cable Company does not now employ the F. W. Jones quadruplex system. The system used is that known as the Davis-Eaves quadruplex. Differential polarized relays and differential neutral relays are used in this system.

### "Trick" and "Stint."

W. W. M.—The term "trick" was originally used as a nautical term—the turn of one sailor at the helm, usually half a watch, a spell, or turn. In railroad and commercial telegraph service, the word trick has been widely used during the past forty years to designate the periods of the day worked by two or three men in covering a single position. The twenty-four hours of a day divided into three eight-hour tricks, signify that each period is a "trick." The first trick may be from 8 a. m. until 4 p. m., the second trick from 4 p. m. until midnight, and the third trick from midnight until 8 a. m. A "split trick" may refer to a total period of eight hours divided into two parts—two hours, or four on duty, then a stated period off duty, the remainder of the eight hours to follow. The word "stint" refers to an allotted specific task. In telegraph service this means the handling of a stated number of telegrams in a given time. In a given instance a telegrapher may be required to handle 225 telegrams between the hours of 8 a. m. and 4 p. m., daily, for a regular monthly salary. In addition to this, the understanding may be that he is to receive one cent bonus for each telegram handled during his regular trick in excess of 225. Thus, an operator handling 500 telegrams per day is paid $2.75 bonus for that day—his "stint" being 225 messages.

### Resonant Circuit.

C. L. H.—With a 60-cycle e.m.f., and a capacity of five microfarads, to make the circuit resonant requires an inductance of 44 henries. With sixteen microfarads the inductance should have a value of 1.41 henries.

### Operation of Morse Duplex.

M. E. N.—Our correspondent asks the question: "In the operation of a differential duplex or quadruplex, how does the current from the distant battery make signals on the home relays when like poles, that is, both positive or both negative potentials, are to line at each end at the same time?"

When the terminals of a wire are at equal potentials, no current will flow in the wire. Therefore, when like poles are applied at each end of a duplexed or quadruplexed line, no current flows from terminal to terminal, and the fact that the relays

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operate is due to flow of current to ground through the artificial line rheostats at each station.

On each occasion when like poles are to line at each end, current from the home battery flows through the artificial line via the artificial line coil of the relays, and the armature of the polar relay is attracted toward its back-stop if the opposing batteries both are positive, and toward the front-stop if the opposing batteries both are negative. Each station, in effect, makes on its own polar relay the signal intended to be transmitted from the distant end.

Consider the conditions existing when the home station is "on ground" (with the home batteries disconnected from the line). The distant station then may operate the home polar relay only by reversing the line current by means of the distant pole-changer. Now, when the home station "cuts in" and places, say, the positive pole of his battery to line (by leaving the pole-changer key open), then, when the distant station presents positive battery to line in the act of making a signal, it is plain that there will be no current in the line wire; but the home positive battery still has a path to ground through the relay coil and rheostat.

### The Mile-Ohm.

J. J. D.—The mile-ohm measurement of telegraph and telephone line wire represents the weight in pounds of a wire one mile long having a resistance of one ohm. The mile-pound is the resistance in ohms of a wire one mile long and weighing one pound. If a certain wire 52.8 feet in length at a given temperature has a resistance of .0597 ohm, and weighs 7.87 pounds, the mile-ohm of that grade of wire will be:

$$\frac{(7.87 \times 5280) \times (.0597 \times 5280)}{52.8 \times 52.8} \text{ or, } 4700.$$

Mile-ohm and mile-pound measurements are mainly made at the wire factory. Telegraph and telephone companies submit to the manufacturers definite written specifications which contain the mile-ohm requirements of wire to be purchased.

### Spark Frequency.

A. W.—The spark frequency of a radio set is the number of individual sparks which break across the spark-gap of the closed oscillatory circuit in one second. When a 500-cycle synchronous transmitter is employed which gives 1,000 sparks per second, the wave-train frequency is 1,000 per second.

### Book on Alternating Currents.

Arithmetic of Alternating Currents, is the name of a new book by E. H. Crapper. For those who are familiar with elementary mathematics, this book will be found valuable as it describes in a thorough manner periodic and alternating currents; generation of alternating electromotive forces; inductances; inductive circuits; capacity and condensers; resistance, inductance and capacity in parallel; static transformers; induction motors and transformation of currents.

The book contains 208 pages. Price $1.25. Copies may be purchased from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

### New Radio Call Book.

The Consolidated Radio Call Book, which contains 2,500 calls in addition to those listed in the Berne Bureau's call book of April, 1918, is now ready for distribution. The book will be of great value both to the amateur as well as the professional radio operator. In addition to the complete list of radio ship and shore station calls of all nations the book contains a large amount of information relative to radio traffic handling, rates, etc. Copies may be purchased from TELEGRAPH AND TELEPHONE AGE, at $1.00 per copy.

### "The Sword and the Soul."

The above is the title of a new book by Col. W. R. Plum, the veteran telegrapher of civil war fame. The story deals with the adventures during the war of a Union telegrapher who had many hairbreadth escapes, and who performed many ingenious exploits in erecting and maintaining telegraph lines for the use of the Federal military forces.

The story is cleverly written; the plot is absorbing; the book is well illustrated and beautifully bound. $2.00 per copy from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

### Cable Codes.

TELEGRAPH AND TELEPHONE AGE is headquarters for all cable cipher codes. Telegraph managers would do well to bear this fact in mind when customers make inquiries regarding such codes. We are prepared to furnish full information on the subject, our knowledge being based on over thirty-five years' experience in handling the hundreds of codes on the market. Address TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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# CURRENT EVENTS

## EXECUTIVE OFFICE ANNOUNCEMENTS, PERSONAL MENTION, APPOINTMENTS

### WESTERN UNION TELEGRAPH COMPANY.

NEWCOMB CARLTON, president, attended the annual entertainment and dance given in the Central Opera House, New York, on the evening of November 11, by the New York Telegraphers' Aid Society. More than 1,000 telegraph employees were present.

THOMAS W. CARROLL, general manager, Eastern Division, is on an inspection trip to offices throughout the New England states.

A. A. PATTERSON, during the past ten years manager at Bay City, Mich., has resigned to accept the position of general office manager of the Aladdin Company, building manufacturers. Mr. Patterson has been identified with the Western Union Telegraph Company continuously during the past twenty-one years. The selection of Mr. Patterson for the important position he is to occupy is a noteworthy recognition of the excellent business training men receive as managers of telegraph offices.

EDGAR M. STRODES, has been appointed chief operator at Akron, Ohio, vice D. W. Uplinger, transferred, effective November 1.

RICHARD C. JOHNSON, formerly manager, has been appointed chief operator at Grand Junction, Colo., effective October 15. The office has been placed in the functional class.

BERNARD JAEGER was, on October 13, appointed chief operator at North Platte, Neb.

HARRY H. KNAPPENBERGER has been appointed chief operator of the Kansas City, Mo., "W" office, effective October 1.

J. H. DICKSON, formerly with the Great North Western Telegraph Company at Plattsburgh, N. Y., is now manager of the Western Union office at Hanover, N. H.

S. D. BARGER has been assigned to the late night force in charge of Morse operation of the Los Angeles, Calif., office.

### New York Western Union.

H. REIPSTEIN has been appointed chief operator of the office in Grand Central depot, effective October 1.

AN INTERESTING MEETING of New York Morse Local No. 101, Association of Western Union Employees was held at No. 24 Walker Street on November 6. The meeting was addressed by Acting President J. J. Keefe, who outlined the benefits that had been secured for the employees during the past year. After the transaction of routine business an election of officers was held. J. J. Keefe was elected president; Miss G. McMullin, secretary-treasurer; also a grievance committee composed of J. Cashman, Robert Craig and Miss K. McNally. Mr. Keefe is very popular with the employees and his election to the presidency meets the approval of all who know him.

A TYPEWRITER SPEED CONTEST, under the Underwood rules, was held in the copying department of the distributing center on November 1, 2 and 3. The contestants included members of the three forces. The following were declared the winners: M. Harris, first; R. Dubinsky, second; and I. Greenberg, third.

FRANK LOWRY, aged 68 years, a member of the force since the early seventies died on November 5.

GEORGE D. WILKINSON, testing and regulating department instructor, has accepted a position in the service of the United States Signal Corps, and will be located at Camp Vail, Little Silver, N. J. Mr. Wilkinson has had twenty-two years' experience in the telegraph service, during which time he has been a student of the various systems of automatic and printing telegraphs.

C. J. MULLER has returned from service in the Navy, and has taken up his former duties as Marine Chief in the office at 24 Walker Street.

MRS. K. MCDONALD, of the main operating department, accompanied by her sister, Miss Anna Noonan, have returned from their vacation, which they spent at Atlantic City.

### Western Union Lake Division.

JOHN F. HAAS has recently been added to the general manager's staff as division commercial manager. Mr. Haas entered Western Union service at Nashville, Tenn., as messenger boy in October 1894; later progressing through the grades of clerk.

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operator and branch manager. In 1902 he was employed as operator, and from there was appointed manager, serving at various offices in the Boston district. For a time he was employed as clerk in the superintendent's office at Boston, and later went to San Francisco and was employed as district commercial manager. Returning to the east Mr. Haas was employed as district commercial manager under Superintendent Boening at Detroit, Mich. In 1918 he was appointed office manager at Detroit, which position he held until his recent promotion to the division commercial managership at Chicago.

GEORGE V. BLACK, formerly of the cashier's office, Chicago, has been transferred to the superintendent's office, succeeding John W. Tully transferred to the general manager's office.

JOSEPH MORRISON, formerly of the credit department, has been transferred to the managership of "Hr" branch office, succeeding Mrs. Pearl Frakes, transferred.

E. J. WRIGHT, formerly of the credit department, has been transferred to the money transfer department.

CHICAGO COMMERCIAL LOCAL NO. 3, Association of Western Union Employees is being widely complimented on the successful presentation of the play "A Bachelor's Romance," recently given under its auspices.

MESSRS. BOULBOULLE AND ARMSTRONG of the commercial department; Wire Chief Johnson of the traffic department, together with several expert operators, represented the Chicago office at the University of Chicago vs. University of Illinois football game at Champaign, Ills., on November 1.

CHICAGO EMPLOYEES of the company are looking forward to the time when they will be comfortably housed in the new building now nearing completion on South La Salle Street. A casual inspection of the new quarters shows that everything possible is being done by the engineers to make the company's new home comfortable for the employees as well as up to date from the standpoint of efficient operation.

O. Z. CRANE of Boston, Mass., the genial representative of the International Cable Directory Co., is in Chicago renewing his telegraph acquaintance.

## Detroit, Michigan, Western Union.

CITY SUPERINTENDENT BURR presided over a very interesting commercial department meeting following a dinner at the Fort Shelby Hotel, on September 30, which was attended by district commercial managers, department heads, traffic representatives and branch office managers.

THE FIRST SOCIAL EVENT of the season of Detroit Local No. 89, Association of Western Union Employees, took place at St. Andrews Hall on the evening of October 5, in the form of a masquerade ball. The party was a pronounced success. Secretary and Treasurer James G. Hayes, Division Vice-President Campion and Division Traffic Supervisor Murphy, of Chicago, and about fifty Association members from Toledo Local joined in making the affair a success. The Toledo folks promise to return the entertainment at an early date and give the Detroit members an equally good time.

AT A MEETING of Detroit Commercial Local No. 156 on October 5, it was decided to consolidate with Traffic Local No. 89, making one large Local Association.

EARL B. MILLER of the traffic department has been appointed manager of "Ab" branch office, vice Miss Juif, transferred.

MISS ANNA UNRUH, secretary to City Superintendent Burr, recently operated on for a physical ailment, is reported on the road to recovery.

MRS. FANNIE K. ENNIS, for some time a member of the city superintendent's staff has been transferred to Buffalo, where her husband, Lieut. Harry Ennis of the United States Marine Corps is stationed.

## Cincinnati Western Union.

TO THE Cincinnati telegraph fraternity it is interesting news that, according to the latest returns, Rodney G. Bryson, an attorney at Covington, Ky., has been elected to the State Legislature. Mr. Bryson, until November, 1918, was one of our first class telegraphers, and was a popular member of the force.

THREE HUNDRED members of the Association of Western Union Employees attended the dance given in Assembly Hall, Odd Fellows' Temple, Cincinnati, October 15.

CHESTER VAN KUREN of Toledo, and Willard Clore of Aurora, Ind., were visitors in the Cincinnati office recently. Mr. Clore is now in the grocery business.

GENERAL INSPECTORS Bellman and Casper paid us a visit recently. These gentlemen are always welcome.

MR. BRANGAN, in charge of the New York stock wire in the commercial news department, has returned to duty after a leave of absence on account of illness.

E. W. EDMONDS has been added to the manager's staff at Cincinnati, Ohio. For several years Mr. Edmonds has been in the service of the Postal Telegraph-Cable Company.

MISS HELEN KLOSTERMAN, multiplex supervisor, and Adolph Brungs, sectional supervisor in the multiplex department, were married on September 24. The wedding trip was to Cleveland and Niagara Falls.

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MESSENGER Charles Richter, while engrossed in reading in the morning paper an account of King Albert's visit to Cincinnati, was handed a telegram for delivery to a member of the King's party. Arriving at the railroad depot, Charles found that the special train to which the King's car was attached was pulling out of the yards. The boy sprinted for the car, and, catching up with it, boarded, and delivered his message. For his performance, Charles was rewarded by a handshake from King Albert, which he says was recompense enough to last a long time.

L. J. TUCKER, for a number of years wire chief at Oklahoma City, Okla., has accepted a position with the American District Telegraph Company, being succeeded at Oklahoma City by Charles Blevins, formerly assistant wire chief.

MANAGER E. W. KING, of the Quincy, Ills., office is moving 90 per cent of the traffic originating at his office, in three minutes, and 100 per cent of the traffic within five minutes. Recently the local staff was given a dinner at the Hotel Quincy, and all were complimented on the excellent showing made in expediting message traffic.

THE COMPANY is installing a new and modern office at Niles, Ohio. Austin R. Fox is manager of the office and Gordon Laughlin, operator.

## Western Union Gulf Division.

S. M. ENGLISH, general manager, has just completed a six weeks' tour of inspection over his division. He traveled in the business car *Morse*. Mr. English was accompanied by B. D. Barnett, division commercial manager. Several group meetings of managers were held en route.

IN THE GULF DIVISION, new independent telegraph offices have been installed at Weatherford, Okla.; and at Kenedy, Texas. F. C. Gardner has been appointed manager at the former, and Mrs. Thomas Reed, manager at the latter place.

GUY V. WOMACK has been transferred to Okmulgee, Okla., as office manager. Okmulgee has become one of Oklahoma's most prosperous towns.

J. P. ROHLING, who has been acting division auditor, has been appointed division auditor, effective from November 1. The following appointments have been made in this office: S. H. Frasier, supervisior of traveling auditors and relay control bureaus; C. H. Strickland, disbursement supervisor; J. N. Veach, revenue supervisor; W. H. Rushing, office service supervisor, and A A. Hartley, chief bookkeeper.

THE TELEGRAPH BUSINESS in Dallas, and the surrounding territory, relayed by the Dallas office, has grown by leaps and bounds during the past year, until now Dallas is the third largest relay office of the Western Union in the United States. The operating department now covers three entire floors of the Trust Building, whereas up to a short time ago only one floor was used. The oil business in the North Central Texas field, together with general development of the use of the telegraph is responsible for the enormous increase.

Dallas is working nine duplex circuits to as many towns, which, before the oil boom, were mere villages, with a few country stores. Two of these places, Breckenridge and Desdemona, Tex., are as yet without railroad facilities. The business in this section has crowded the wire facilities until it has been necessary to establish a relay office at Sweetwater, where a force of fifteen persons are employed under Chief Operator F. A. Pledger, who has been handling the office for some time as an important repeater station. Furthermore, Manager L. A. Ott has been able to report 50 to 75 per cent increase in city business of Dallas proper, above last year's figures. Manager Porteous, New Orleans, La., reports 81 per cent increase over last October, as the result of a special campaign.

It is difficultt to predict to what extent this business will grow; in fact, the Gulf Division has wonderful opportunities for development along every line, and a steady growth is assured as the result of an enthusiastic drive by all employees to explain the many uses of our services, even though the oil boom subsides.

## Western Union Conference at Portland, Ore.

On October 9 and 10, a commercial development meeting was held at Portland, Ore., for the purpose of bringing to the attention of the company's managers and commercial department employees the present opportunity to increase telegraph traffic.

At this meeting, addresses were made by Messrs. M. T. Cook, general manager, San Francisco; A. C. Kaufman, general commercial agent, New York, and F. C. Cole, district commercial superintendent, Seattle.

A dinner was served at the Multnomah Hotel.

In addition to Messrs. Cook, Kaufman, and Cole, those present at the conference were: C. F. Newsom, division commercial manager, San Francisco; E. A. Klippel, superintendent of telegraph, O. W. R. and N. Railway, Portland, Ore.; H. M. Huston, superintendent of telegraph, S. P. and S. Railway, Portland; E. L. Mackenroth, assistant superintendent of telegraph, Northern Pacific Railroad, Tacoma; C. A. Rhodes, division auditor, C. R. Fisher, division traffic superintendent; A. E. Barnes, secretary to the general manager; S. E. Murray, district commercial manager; R. D. Miles, district commercial manager; W. E. Brooks, chief operator, Portland; W. A. Robb, commercial agent, Portland, and the following office managers: W. R. Williams, Portland; E. R. Prazak, Aberdeen; R. F. Henley, Astoria; Eric Butler, Salem; J. A. McKevitt, Eugene; R. McCann, Medford; Don Belding, Klamath Falls; L. G. Alrick, Baker; S. Wertheimer, Walla Walla; C. E. Nichols, Bend; and F. E. Divens, La Grande.

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### Western Union Conference at Seattle.

On October 6 and 7, a commercial educational development meeting was held at Seattle, Wash., for the purpose of bringing to the attention of the company's office managers the present opportunity to increase telegraph message traffic.

At this meeting addresses were made by A. C. Kaufman, general commercial agent, New York; F. C. Cole, district commercial superintendent, Seattle, and C. F. Newsom, division commercial manager, San Francisco.

A dinner was served at the Washington Hotel.

Those present at the conference, in addition to Messrs. Kaufman, Cole and Newsom, were: W. F. Schwandt, division traffic supervisor, Seattle; E. L. Ritter, district plant superintendent, Seattle; C. I. Hall, district commercial manager, Seattle; F. C. McMullen, chief operator, Seattle; and the following office managers: W. J. Smith, Seattle; B. S. Jones, Spokane; C. H. Daniels, Vancouver; R. R. Sprinkle, Tacoma; F. H. Blashfield, Victoria; W. A. Robb, Portland; J. T. Hull, Port Angeles; E. C. Johnson, Olympia; J. R. Hammer, Hoquiam; C. G. Bunnell, relief manager; R. E. Michael, Bellingham; G. O. Trivett, Wenatchee, and R. Zimmerman, Everett.

### Bogus Money Transfers.

John J. Kelleher and Edward Slattery, telegraph employees, who sent and collected money on bogus telegraph money transfers, were indicted in Baltimore, Md., on September 25, and, on October 10, both were sentenced to eighteen months in the Maryland penitentiary. At the time of their arrest they had on their persons $424.00, which amount was taken by the police authorities and turned over to the telegraph company.

### Opportunities for Signal Corps Applicants.

Authorization has been received to reorganize Company C, to be attached to the present First Battalion Signal Corps, New York Guard, and former signalmen who served in the United States Army during the World war may re-enlist for a period of one year, providing they do so within six months from July 11, 1919.

Captain Lawrence J. Gorman will command Company C and he is particularly anxious to see old Company C well represented in the organization.

Just now, opportunities for non-commissioned grades are numerous. The new organization will afford plenty of opportunity for rifle practice, mounted work and instruction in up-to-date methods of army field communication.

Captain Gorman can be interviewed at the headquarters of the Signal Corps, 34th Street and Park Avenue, New York City, any Monday or Thursday evening, or Saturday afternoon.

## POSTAL TELEGRAPH-CABLE COMPANY.

CLARENCE H. MACKAY, president, has returned from Europe, where he spent three weeks on business connected with the Commercial Cable Company.

EDWARD REYNOLDS, vice-president and general manager, is on an inspection trip through the west and expects to visit all the larger offices of the company in that section.

E. P. TULLY, assistant to the general manager, recently visited Detroit and Chicago.

C. A. COMSTOCK, assistant to the general manager, has just returned from a trip through New York State.

H. W. HETZEL, traveling auditor, has just returned to New York after an absence of several months.

J. P. O'DONOHUE, division electrical engineer, visited Pittsburg recently for conference with W. L. Simpson, division electrical engineer of the Western Division.

D. H. GAGE, of the engineering department, is in Philadelphia on company business.

IN THE NEW YORK CITY operating department the following changes in staff have recently been made:

E. A. CONEY, has been promoted to be assistant manager.

E. J. RANKIN, has been made night manager, vice E. A. Coney.

J. P. WILLIAMS, has been advanced to the position of assistant night manager, vice E. J. Rankin.

CHARLES SHIRLEY, has been appointed secretary of the Postal Telegraph Employees' Association, succeeding E. M. Underhill.

MANAGERS APPOINTED: C. N. Corey, Alton, Ill.; Fannie Hinson, Aiken, S. C.; N. McKay Bryan, Elizabethtown, S. C.; T. E. Mc Getrick, Camden, N. J.; E. V. Hartman, Toledo, Ohio; L. V. Todd, St. Augustine, Fla.; B. L. Smith, Clarksville, Tenn.; Miriam Hardin, Newton, Miss.; Zelma Richards, Grinnell, Iowa.; R. T. Desler, Charlottesville, Va.; Charlotte Walton, Goldsboro, N. C.; M. W. Hicke, Las Animas, Colo.; M. Allen, Rocky Ford, Colo.; Joseph Seemayer, Granite City, Ill.; F. J. Curtis, Tiffin, Ohio; Dorothy M. Groesser, Holland, Mich.; M. W.Brock, Indiana Harbor, Ind.; T. P. Roberts, Waynesboro, Ga.; F. C. Hooper, Sanford, Me.; R. D. Wyman, New Bedford, Mass.; Amy Bellatty, Bath, Me.; N. Silverman, Nashua, N. H.

### Chicago Postal Notes.

H. W. HONIC, force chief, has returned from his annual vacation.

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MISS MILDRED DAVIDSON, for many years employed as a Morse operator in this office, has resigned on acount of sickness in her family.

HOMER J. BARRY and Benjamin E. Reed, late of the American Expeditionary Forces, and employees of this office, have both joined the benedicts.

THE RECENTLY ORGANIZED Social Club, in connection with the Chicago main office, will start the season's festivities with a dance party on Saturday evening, November 29. Officers of the club are: Louis Erlix, president; Charles H. Vihon, vice-president and Carl J. Fern, secretary and treasurer.

THE CHICAGO POSTAL BOWLING LEAGUE finished the first quarter on Tuesday evening, October 28. P. J. O'Keefe, of the operating department team No. 1, and C. H. Reblin,, of the general office team, captured the individual honors, with an average of 168 pins. The branch offices head the League with a percentage of 834.

H. H. DENGLER, assistant chief operator, is agent for TELEGRAPH AND TELEPHONE AGE in the Chicago main office.

MRS. LOUISE W. POTTER, wife of C. W. Potter, night manager of the main office Chicago, Ill., died in that city, October 22. Interment was at Forest Home Cemetery. Mrs. Potter was the first woman telegrapher employed by the Postal Company in Chicago, her service covering a period from 1884 until 1896, in which latter year she retired.

## San Francisco Postal.

J. J. LYNCH, superintendent of construction, is making a trip of inspection over the lines between San Francisco and Portland.

R. F. SHELLY, formerly night chief operator at Butte, Mont., is now quadruplex chief in San Francisco office.

L. J. MILLER, assistant manager at San Francisco, has taken the position of day traffic chief in the operating room, vice R. D. Thompson, who goes into the Morse department.

M. O'NEILL, chief operator, has returned from his annual vacation.

H. S. BENNETT, formerly night chief operator at Salt Lake City, Utah, has accepted the position of chief operator at Butte, Mont.

ASSESSMENTS Nos. 663, 664 and 665 have been issued by the Telegraph and Telephone Life Insurance Association, covering the deaths of Georgiana Patterson, Erastus A. Barnard, Robert H. Bowron, L. K. Whitcomb, Frederick W. Koehler, Charles J. O'Connor, W. F. Archibald, James A. Greene, Thomas I. Hewlett, Daniel E. Smith, Samuel H. Jones, Wilson Miller, Anna J. H. Fletcher, Mary L. Bryan, John E. Mattern, John E. Bierhardt, Brooks P. Humphrey and Fred M. Turk.

## THE CABLE.

AT SIX O'CLOCK on the morning of November 11, service on all the lines of the Commercial Cable Company was suspended for a period of two minutes, in commemomoration of the signing of the Armistice, terminating the late European war, and in memory of the sacred dead.

## Disposition of Seized German Submarine Cables.

In French peace conference circles the foundation of an international commission for the purpose of distributing among the Allies supervision and management of the submarine cables seized from the Germans is being advocated.

When the armistice was signed France and Japan had a brief interchange of views, under which it was proposed that all war booty should be retained. This point of view was not adhered to then by the United States, and a temporary agreement was reached under which the Emden-Vigo, one of the Emden-Azores cables, the Monrovia-Lome (German West Africa) and the Constantinople-Kustenji (Rumania) cables should be placed under British management; the Emden-Teneriffe, the Emden-Azores and Teneriffe-Pernambuco, the Emden-Brest and the Azores-New York cables reverting to the temporary direction of the French, and the Japanese controlling all the Far Eastern German cables.

This situation obtains at the present time, but the desire is to reach a final settlement as to the status of the one time German lines. The sentiment among the French peace delegation is that the cables should be apportioned between the Allies, France retaining permanently those which she is now operating

## Cable Staff Changes.

EASTERN TELEGRAPH COMPANY: A. F. Loveday and T. Minto, to Capetown; W. A. MacKenzie and N. W. J. Skertchly, to Ascension; H. C. Maxwell, to Delagoa Bay; M. C. L. Calcraft and H. F. L. Skey, to Zanzibar; L. F. Datson and H. Lunn, to Mozambique; J. H. Andrew, L. A. Broadrick and C. P. T. Bryans, to Carcavellos; H. S. Foden, J. R. Taylor, L. B. Sanford and E. G. Gosling, to Durban; M. O. Pibworth; E. G. Davis, J. S. Cartmel, A. K. Murphy, C. G. Gott, and G. E. Atkinson, to Aden; W. O. Bacon, A. Heath, and D. M. Ross, to Malta; J. T. Knight, G. C. Smith and C. H. Herbert, to Suez. The following retired on pension on November 1: Nigel Kerr, superintendent at Carcavellos; Thomas Edge Anderson, superintendent at Port Said; Henry Whitford, superintendent at Newcastle; Henry William Parker, at Porthcurnow; Chares Edward Paine, superintendent at Suez. Effective January 1, 1920, the following retire on pension: Peter Tait, superintendent, Capetown; John G. Youngson, superintendent at London, and Percy E. Burrell, superintendent at London.

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## THE TELEPHONE.

### American Telephone and Telegraph Company.

DEPARTMENT OF DEVELOPMENT AND RESEARCH.

The recent reorganization of the management of the American Telephone and Telegraph Company included the establishment of a department of development and research, with the following official appointments: John J. Carty, vice-president; Karl W. Waterson, executive officer; Lyman F. Morehouse, equipment development engineer; Frederick L. Rhodes, outside plant development engineer; Otto B. Blackwell, transmission development engineer; Howard S. Warren, electrical interference engineer, and George A. Campbell, research engineer.

FRANK H. BETHELL, first vice-president of the New York Telephone Company, and active head of the eastern group of Bell Telephone companies, has resigned to become vice-president in charge of finances of the White Oil Corporation, New York.

UNION N. BETHELL, who recently resigned as vice-president of the American Telephone and Telegraph Company, has tendered his resignation as chairman of the Board of Directors. Mr. N. C. Kingsbury succeeds Mr. Bethell as a director and member of the executive committee.

H. F. THURBER, has been elected president of the New York Telephone Company, succeeding U. N. Bethell, resigned. Since 1912 Mr. Thurber has been vice-president in charge of the eastern group of Bell Telephone Companies.

L. H. KINNARD has been elected president of the Bell Telephone Company of Pennsylvania, succeeding F. H. Bethell, resigned. In the same company John C. Lynch has been elected vice-president and general manager, and James L. Kilpatrick becomes assistant general manager. Mr. Lynch has heretofore been general superintendent of traffic of the company, and Mr. Kilpatrick, engineer.

C. B. ALLSOP has been appointed traffic engineer of the Pacific Telephone and Telegraph Company, vice H. W. Beard.

M. D. SEDAN has been appointed superintendent of traffic of the Central Division, Pacific Telephone and Telegraph Company.

F. N. RUSH has been appointed superintendent of traffic, Southern Division, Pacific Telephone and Telegraph Company.

W. G. THRALL has been appointed acting district traffic chief at Portland, Ore., for the Pacific Telephone and Telegraph Company, vice G. E. May. C. L. Hunt succeeds C. F. Cole as district traffic chief at Eugene, Ore., and the following district traffic chiefs have been appointed: L. M. Griffin at San Jose, Calif., V. E. Cooley at Fresno, Calif., and A. L. Littig at Los Angeles, Calif.

IN THE AMERICAN TELEPHONE AND TELEGRAPH COMPANY the capital stock is held by over 135,000 individual investors, each stockholder of record holding an average of 38 shares. This includes the holdings of saving banks, insurance companies, etc., which though large in the aggregate, represent small individual savings or small interests.

A CONFERENCE was held in Chicago, during the last week of October, participated in by engineers of the Western Electric Company and of the American Telephone and Telegraph Company. Engineers in the service of these companies in all parts of the country attended the conference. Among those who attended from New York were: F. B. Jewett, E. B. Craft, E. H. Colpitts, W. F. Hendry, J. H. Bell, A. J. Eaves and A. M. Nicolson, of the Western Electric Commpany; and O. B. Blackwell and L. F. Morehouse, from the American Telephone and Telegraph Company.

A. M. ROBERTS has been appointed representative for Indiana of the Stromberg-Carlson Telephone Manufacturing Co.

## PERSONAL.

W. NOBLE, engineer in chief, British Post Office Telegraphs, accompanied by Messrs. B. O. Anson, J. Hedley and A. B. Hart, is now visiting the United States in the interests of the British telegraph service.

LIEUTENANT J. J. MALONE, of the Australian telegraph service, is spending a few weeks in New York, on his way home from military service in France. Lieutenant Malone is investigating American telegraph systems and methods.

FRANK GILL has been appointed chief engineer of the Western Electric Company in Europe. Mr. Gill began his telephone work in London, in the year 1882, and is one of the most widely known telephone experts in Europe.

P. B. DELANEY, the well known inventor of telegraph apparatus and systems, has returned to New York for the winter, having spent the summer at his place at Nantucket, Mass.

HOWARD L. KRUM, general manager, Morkrum Company, Chicago, was married recently, and is in New York on a honeymoon trip. Mr. Krum's friends in the telegraph service extend to him all good wishes for a long and prosperous life.

THE OLD WIRE CHIEF says: "One thing I have labored hard to overcome is that of stirring in other people the autobiographical impulse. Often the flood-gates are opened before I can get my foot in position."

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## RADIO TELEGRAPHY.

### Marconi Notes.

MR. AND MRS. EDWARD J. NALLY, are at White Sulphur Springs, Va., on a two weeks' vacation.

E. B. PILLSBURY, general superintendent, is spending his vacation in New England.

H G. OGDEN, patent attorney, has moved his office from the Woolworth Building to the Astor Building, 217 Broadway.

A NUMBER of the head office employees were entertained at dinner and theatre party on the evening of November 10.

### Radio Engineers Nominate Officers

For the coming annual election of officers of the Institute of Radio Engineers, the Board of Direction of the Institute has nominated the following gentlemen for the offices designated: For president, John V. L. Hogan, of New York, and General G. Ferrie, of Paris, France. For vice-president, Ernest F. W. Alexanderson, of Schenectady, N. Y., and Lloyd Espenschied, of New York. For secretary, Alfred N. Goldsmith, of New York. For treasurer, W. F. Hubley, of Newark, N. J., and George S. De Sousa, of New York. For managers serving until January 1922: E. H. Armstrong, Emilio E. Dagassan, W. W. Hanscom, Robert H. Marriott, Donald McNicol, and A. Hoyt Taylor. For managers serving until January 1923: W. H. C. Bullard, Fulton Cutting, Marius C. A. La Tour, Alexander Reoch, David Sarnoff and G. O. Squier.

### Institute of Radio Engineers.

At the regular monthly meeting of the Institute, held in the Engineering Societies' Building, New York, November 5, Greenleaf W. Pickard, one of the American pioneers in wireless telegraph work, presented a paper, entitled "Static Elimination by Directional Reception."

Mr. Pickard reviewed practically all of the early and present attempts to improve radio telegraph signaling by means of directional systems. He also gave an interesting description of the Otter Cliff's, Me., radio station used during the late war. His talk was supplemented by the presentation of a large number of lantern slides.

The meeting was attended by about two hundred radio engineers, including Dr. Lee De Forest, Frederick K. Vreeland, Leonard F. Fuller, C. V. Logwood, Dr. Alfred N. Goldsmith, John V. L. Hogan, George H. Clark, E. J. Simon, W. F. Hubley, Harry Shoemaker, C. L. Farrand, Lieut. J. J. Malone, and H. P. Corwith.

IT IS STATED that the Sable Island, Canada, station of the Marconi Wireless Telegraph Company, recently destroyed by fire, is to be rebuilt immediately and on a larger scale. The station will be equipped with long range apparatus.

NOTICEABLE IMPROVEMENT has taken place within the past two weeks in the transmission of calls and messages from the radio stations in the vicinity of New York under government control. We have several times called attention to the erratic sending of radio operators, especially those who use semi-automatic transmitters. When this difficulty has been corrected and such absurdities as triple sending of radiograms, and other unnecessary service operations have been discontinued, radio traffic may grow to commercial proportions.

THE INSTITUTE OF RADIO ENGINEERS is experiencing a rapid growth in membership. The number of members at the present time exceeds 2,000.

OLIVER J. LODGE, eminent British scientist, and one of the earliest radio investigators, intends spending several weeks in the United States during the coming winter. He will arrive in New York in January.

## RADIO TELEPHONY.

Nugent H. Slaughter, research engineer, Western Electric Company, New York, and during the late war a lieutenant colonel in the Signal Corps, on October 30, delivered a paper in Philadelphia at a joint meeting of the Franklin Institute and the American Institute of Electrical Engineers, on the subject of radio telephony.

"A combination of wire and wireless telephony," said Mr. Slaughter, "may result ultimately in a telephone system covering the civilized world. Any prophecy as to the future of the wireless telephone should take due account of the fundamental difference between wire and wireless telephony. Although it is conceivable—not probable, however—that improvements in directive radiation may be evolved that will cause the greater part of the waves radiated from a wireless station to choose a particular path rather than be spread broadcast, as at present, there will be always a far more definite and restricted path for wire telephone signals than for wireless telegraph signals.

#### COSTLINESS A BAR SO FAR.

"To the average person the most interesting commercial application of wireless telephony is transoceanic. Although the scientific aspects of the question are such that the development of sutiable apparatus for effecting reliable commercial service between such points as New York and London is a comparatatively simple matter, economic questions up to the present have prevented serious consideration of such a project. It is entirely conceivable that improvements in the science soon may bring the cost of such a system well within the limits imposed by economic consideration."

"Wireless telephony between ships at sea or between a ship and a shore station is a logical supple-

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ment to the wireless telegraph service now furnished on virtually all ocean-going steamships. In this case, as in the case of trans-oceanic telephony, economic considerations are likely to retard the extension of this field until the development of apparatus less expensive than the present type.

In the navy, army and marine corps, said Mr. Slaughter, many valuable and successful experiments now are being made in the science of transmitting speech by means of electrical waves.

PRACTICABLE FOR AVIATION.

Mr Slaughter believes in the practicability of wireless telephonic communication in the aviation service.

"In the field of aviation," he said, "wireless telephony presents a number of advantages, and it is believed these will result in its rapid adaptation to this service. Entirely aside from the popular interest attached to telephone communication between an airplane and a ground station, the practical value, particulary of the latter, is sufficient in many instances to justify the required expenditure to provide this facility.

"The use of wireless telephony within an airplane squadron at once makes possible the development of the squadron into a military unit where the various members are subject to the command of the leader in exactly the same way as military units on land and water.

"The availability of the wireless telephone will open up new possibilities in the use of airplane to ground communication, an example of which is furnished by the present operations on the Mexican border. Scouting parties accompanied by airplanes traverse the extremely mountainous country, with airplanes preceding the land forces and at intervals reporting their observations.

"The use of wireless telephone apparatus in combat service during the war," said Mr. Slaughter, "was virtually negligible. This should, however, not be interpreted as an indication that wireless telephony offers no advantage for military purposes, but rather that the development of the apparatus and the training of personnel in its use had not proceeded sufficiently to warrant its use.

"The present state of the art, which has proved that communication can be established between Washington and Paris or between Washington and Honolulu, indicates the certainty that this will be done.

"Developments that have occurred in the war period," said Mr. Slaughter "although essentially of a military character, are immediately applicable to both military and commercial needs. These developments point the way to further progress in the science that it is believed will establish within a short time wireless telephony as an important element in many phases of our military and commercial activites."

The lecture, which was illustrated with photographs and explanatory diagrams, was attended by a large number of prominent Philadelphia scientists and electrical engineers.

## FRANCE PLANS WORLD-WIDE WIRELESS SCHEME.

In a recent issue of the *Genie Civil*, M. Boutillon, head of the French Government wireless department, outlined a scheme now under consideration in France for embracing the whole globe with wireless stations erected wholly on French territory. As the result of a mission to America in 1917, at the instance of the Administration of Posts and Telegraph to study the great wireless systems of the New World, the author had come to the conclusion that to sufficiently assure the continuity of communication at great distances it was needful to adopt powers much higher than those now usual. All the great stations in existence (with ranges from 5,000 to 8,000 km.), with the exception of Nauen, employ powers between 200 and 400 kw., and possess antennæ ranging in height between 150 and 200 metres. The energy radiated from them is over abundant in the periods most favorable for transmission, but is insufficient when, as often in summer, to unfavorable conditions of transmission are added strong atmospheric disturbances. Communication then may remain impossible often for many hours together. To overcome this inconvenience the author holds it needful to raise the power to at least 1,500 kw. and adopt antennæ of at least 500 metres in height. As to the system of emission the author, although he has specially devoted himself to perfect the musical spark oscillation method, recognizes that for communication to a great distance, the general practice decidedly and almost without exception favors the use of the continuous waves. With stations of the power proposed and having ranges up to 7,000 km. it would be possible to communicate for six hours each day in summer and 12 hours in winter, while the use of multiplying adjuncts would allow of the increase of transmission from the usual 140 words per minute to 200 words, and the issue and reception of more telegrams with the same antennæ. But in unfavorabble conditions it would always be possible to transmit at a speed of 20 words per minute as the periods of interruption would be shorter and fewer on account of the great power employed. As regards the world-embracing network, the author proposes a continuous line of stations of about 6,000 km. range, which, starting on the west, will comprise the stations at Tahiti, Nouvelle, Calldonie, Indo-China, Djibuti, and France, where splitting into two arms it will terminate at the Senegal and Martinique stations, respectively. The centre of the network is naturally placed in France, and comprises a station of medium power able to communcate with North Africa and three stations of great power to communicate respectively with (1) the United States; (2) Martinique and Brazil; (3) West Africa, and with Djibuti. In West Africa, at Djibuti, and in Indo-China there will be double stations (one of great power to communicate at great distances, and one of medium power for local uses). In detail the network will comprise (1) a quadruple station in France (three

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stations of great power and one of medium power); (2) three double stations; West Africa, Djibuti, and Indo-China (one large station and one medium); (3) three stations of great power; Martinique, Nouvelle Caledonie, and Tahiti; (4) six stations of medium power: Morocco, Algeria, Tunisia, Congo, Madagascar, and French India. As to the organization of the multiple stations the author proposes to place transmission centres at considerable distances one from the other. For instance, in France the four transmission centres will be situated at Arles, Nimes, Bordeaux, and Basse Loire. Reception posts may be placed near those of transmission, and at such a distance as to permit the service in duplex or (and this solution the author seems to prefer) may be united in a single centre of reception near Paris, in which case they will communicate by wire with the four transmission posts.

### Government Electrical Supplies Wanted.

Under the heading of electrical supplies, the Bureau of Supplies and Accounts, Washington, calls for bids for the following material: 2 type "B" annunciators for Brooklyn; 3,000 feet cable, brush holder, for Mare Island; lighting and power cable for Mare Island; 9 automatic motor compensators, for Washington; incandescent lamp cord for Mare Island; phosphor bronze wire for Boston; 15,000 feet weather proof triple-braid wire for Mare Island; 300 pounds of underwriters' wire for Mare Island, and several turbo-generators for Puget Sound.

### Non-Battery Sounder.

The relay attachment manufactured by the Railways Labor-Saving Device Company, of Davenport, Iowa, which takes the place of the local battery sounder, continues to meet with favor in both railroad and commercial telegraph service. As a reading sounder the device is satisfactory, and the cost of local battery sounder is avoided.

### Single Line Repeater.

The single line telegraph repeater manufactured by the Jester-Cooper Company, Houston, Tex., is being used successfully on several large railroad systems and in commercial telegraph service.

The management of this repeater is as simple as that of an ordinary single relay and sounder set, with which all telegraph operators are familiar. No local battery is required in its operation.

THE OLD WIRE CHIEF says: "Each one of us has the privilege of having a private opinion of everyone else, but whether or not we keep it private determines whether or not we are disciples of peace and harmony."

## OBITUARY.

### Death of A. R. Brewer.

A. R. Brewer, seventy-two years of age, died at his home in Glenridge, N. J., on November 7.

While still a young man, Mr. Brewer entered the service of the American Telegraph Company, and worked in the offices at Trenton, N. J., and Wilkes-Barre, Pa., after which he served five years as clerk in the office of Thomas T. Eckert, then general superintendent of the Western Union Telegraph Company. He was later advanced to a position in the office of G. H. Mumford, vice-president and secretary of the company, and was promoted to the position of secretary of the company at the time of Mr. Mumford's death in the year 1875.

Mr. Brewer, over a long period of years, served as secretary and as president of the Telegraph and Telephone Life Insurance Association.

W. W. KELSER, aged sixty-two years, at one time employed as a telegrapher in Washington, D. C., and during the past twenty years a resident of Pittsburg, Pa., died in Pittsburg on October 18. The funeral was held in Washington on October 22.

ALLAN G. HAIGHT, sixty-nine years of age, died in Chicago on November 1. Mr. Haight had been a telegrapher for more than forty years, retiring from Western Union service in January, this year. In the early seventies of the past century, Mr. Haight was a pony express rider in the Black Hills country of Dakota, and later was one of the first telegraphers employed by the Union Pacific Railroad during construction days.

### New Book on Radio Telegraphy.

"Principles of Radio Telegraphy," is the name of a new book by C. M. Jansky, which covers the latest practice in radio engineering. The book contains 237 pages and has 179 illustrations.

The first four chapters deal with elementary electrical engineering as applied to radio work, and the remaining seven chapters go thoroughly into the subjects of electromagnetic waves, alternating currents, oscillatory circuits, radio circuits, practical transmitting appliances and methods, practical receiving appliances and methods, and vacuum tubes and their use in wireless telegraphy.

We recommend this fine work to all who are studying or who intend taking up the study of radio signaling.

The price of the book is $2.50 and copies may be purchased from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

THE OLD WIRE CHIEF says: "The human error which causes the greatest amount of grief to man is that of wrongly viewing his relations to other men."

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# Telegraph and Telephone Age

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## Building Up Telegraph Message Traffic.

When the manager of a telegraph office views himself as the "agent of the sender"; that is, the representative of the public, he finds himself in the position where he can accomplish the most beneficial and profitable results for his employer—the telegraph company.

When the manager gains the confidence of the business public to a degree wherein he is depended upon to pick up telegrams promptly, transmit them immediately, procure replies, and deliver the replies without delay, he is in a fair way to make a success of his business.

The theory that a perfect organization is evidenced by a clean desk and nothing to do, for the manager, is, to say the most for it, a theory. Most successful office managers find from experience that the bulk of their time is spent at the telephone, the front counter, and in the offices of business firms. These three zones of action constitute the field wherein the manager operates as the "go-between" between the public and the vast mechanical, electrical, and human establishment known as telegraph service.

The manager has access to—in a controlling sense has the direction of—the forces that perform the service. This is the advantage he has over the public. From the moment a telegraph patron writes the message he desires to despatch, he has a sort of faith that his telegram will receive individual attention from someone in the service of the telegraph company, and the function of the manager is, largely, to convince the patron by the grade of service rendered, that the message has had individual attention.

The manager must at all times be accessible. When a patron desires individual attention he is rarely in a mood to tolerate delay. Of course, a manager can be in but one place at one time: so, if he is at the telephone, or calling upon a customer at the latter's office, he cannot also be available for a counter call.

This is where organization plays its part. If a manager selects with care those who are to represent him at the telephone or at the counter, when he himself is absent, the attention the patron receives will be as courteous, as intelligent and as sympathetic as that which the manager if personally on hand would have rendered.

It is of the utmost importance that the manager's subordinates be personally trained by him to deal with the public as *he* deals with the public. The manager has available to him a perfectly efficient method of determining how his lessons and instructions are being observed by those upon whom he depends to represent him in his absence. He can "test" telephone attention periodically, and he can by canvass among his patrons learn what their experience is in doing business with his office— that is, with him.

The Western Union Telegraph Company before the war proved conclusively that the volume of telegraph traffic can be increased tenfold by means of development campaigns. At the present time renewed endeavors are being made to build up an increased telegraph message traffic, and every telegraph man, be he messenger, lineman, operator, or wire chief, should be in sympathy with these efforts on the part of the management and the traffic officials to pile up a large volume of traffic. A large volume of message traffic means, mainly, a large gross revenue, and it does not require spectacles to see that in a large gross revenue lies safety for the company and safety for the employee.

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# CALCULATION OF STRENGTH OF HEAD AND SIDE GUYS ON TELEGRAPH AND TELEPHONE POLE LINES AT CROSSINGS OVER RAILROADS

By Stanley Rhoads

The question has been asked as to how the chart of Figure VIII for converting observed to actual velocity, given in the Telegraph and Telephone Age, November 1, 1919, was plotted. The Weather Bureau gives a table of equivalents which shows the true or actual velocity for all values of indicated or observed velocities, from five miles per hour to ninety miles, in steps of one-tenth mile. To the average engineer the chart is more readily usable. The value of ten miles observed is nine and six-tenths in this table. The horizontal direction was chosen for the observed velocities and actual velocities vertical. At the tenth division to the right from the starting point, or zero, a vertical line was traced and a mark made at the nine and six-tenths point, which mark then represented the point on the desired curve for ten miles observed velocity. The points for twenty, thirty, forty, etc., were marked similarly and a curve traced through all the points thus made. The result is the curve of Figure VIII.

To use the curve, simply move a pencil to the right on the bottom margin of the chart until the value of the observed velocity under consideration is reached; then move the pencil up until the curve is reached; thence back to the left border, which point will give the value of the actual velocity wanted.

In the future the railroad telegraph department forces will be called upon to inspect the crossings of other communication companies as well as their own, to see that they have the strength required by the crossing specifications. The method of calculation for the above will now be given in order to complete the record on the more simple cases of pole line calculation.

The side guy calculation for a straight crossing will be given first. The loading conditions are similar to those for the ordinary straight line, as stated in the Telegraph and Telephone Age, October 1, 1919; that is, on the assumption of wind and ice for the territory in which located and for the ultimate number of wires to be carried by the line in its lifetime. These data permit the calculation of the total moment in foot pounds that will be applied to the line when the assumed weather conditions occur. The pole in a guyed structure of this kind is assumed to take none of the horizontal load, but only the dead load downward due to the weight of ice and wires. The slant of the guy must be determined by arbitrary choice or by the conditions at the crossing, which may limit the spread of the anchors. If the calculations are for an existing crossing, the height of attachment of the guy above ground and the distance from the pole that the guy enters the ground (assuming level ground) can be measured. This will give the angle the guy makes with the vertical. The strength of the guy varies with this angle. A wide spread guy obviously need not be as strong as a steep one to hold the same load of wind and ice.

The formula for tension in a guy is—

$$G = \frac{M}{H \text{ sine } A} \qquad (4)$$

But sine $A$, Figure X, is—

$$\text{Sine } A = \frac{1}{\sqrt{1 + \left(\frac{H}{W}\right)^2}}$$

Substituting in (4)—

$$G = \frac{M}{\frac{H}{\sqrt{1 + \left(\frac{H}{W}\right)^2}}} = \frac{M \sqrt{1 + \left(\frac{H}{W}\right)^2}}{H} \qquad (5)$$

In the above, $G$ is the tension in guy in pounds; $M$ is the total moment on the pole in foot-pounds; $H$ is the height of attachment of the guy above ground, in feet; $W$ is the distance from the pole of the point at which the guy enters the ground, in feet, assuming level ground.

The length of span on which the load acts is taken to be half the sum of the spans on each side of the pole under consideration. For example, let the average span length be one hundred feet and the number of wires be thirty, carried on a forty foot crossing pole. The pressure due to the wind for this example will be taken as that due to a wind of eight pounds on half-inch ice. This, from the data at the side of Tables II and III, is $30 \times 40.10 = 1203$ pounds. The center of the load above ground will be thirty-one and one-half feet. based on a setting depth of six feet. The moment

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of the load will be $1203 \times 31.5 = 37894$ foot pounds.

The force is assumed to be taken by the guy with the pole simply acting as a strut, as stated above. If the guy attachment is thirty-one feet above ground and enters earth ten feet from the pole at the ground, the load on the guy will be

$$G = \frac{37894 \sqrt{1 + \left(\frac{31}{10}\right)^2}}{31} = 3968 \text{ pounds}$$

This requires a 4000 pound strength guy to carry the load, but there will be no margin for safety or "factor of safety." The specifications will provide

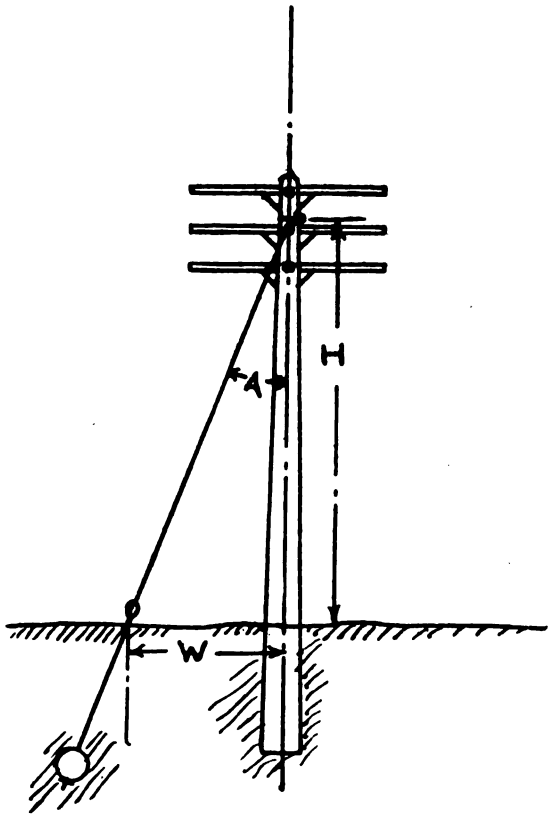


FIGURE X

for this contingency. The average existing crossing is far from being a safe construction and will be found to be guyed much weaker than it should be for the load of wind and ice it will be called upon to resist some time in its life. It will be well to allow some extra strength for variation in the angle at which the guy is put up.

The National Electrical Safety Code, Circular 54, of the Bureau of Standards, expresses the angle of the guy as the "ratio of lead to rise." The "lead" is $W$ in the formula (5) and "rise" is $H$. Some field forces know the lead as the "spread" or "throw."

In the head guying of the poles away from the track the problem is more difficult of correct solution, because the pull of the wires is dependent on the way they are strung, tight or slack. The considerable variation in the sag of the wires in any one span, more noticeable in spans of one hundred and twenty-five to one hundred and fifty feet in length, is a plain indication of this variation. The same variation occurs in the shorter spans, but is not so readily seen. The breaking strength of the conductors is the limiting factor in the load that the pole will be obliged to withstand. The Safety Code mentioned above gives a plan of attack that is practicable. It states that the load shall be taken as one-half the breaking strength of the conductors and that, if the load thus obtained exceeds ten thousand pounds, it shall be taken as ten thousand plus one quarter of the excess above ten thousand pounds; that is, for regions which can be classed as eight pound wind and one-half inch ice territory. In lighter loading territory the loading is proportionally reduced as the wind reduces.

With the number, gauge and kind of wires known, the breaking strength can be found from the wire tables, for use in the calculations. The center of the load is found as in the problem of ordinary pole line strength. The distance multiplied by the sum of the strength values of the wires, gives the moment of the load in foot pounds. From this point the problem is the same as that of the side guy given above. If a messenger is included in the load on the pole, it is neglected in the count of wires, because it serves as a guy.

## Venezuelan Government Invites Bids for Wireless Station.

The government of Venezuela advertises for sealed bids addressed to Ministerio de Fomento de los Estados Unidos de Venezuela to be submitted before June 30, 1920, and marked (in Spanish) "Bid upon wireless telegraph."

The station is to be located in the vicinity of Caracas. It must be sufficiently strong to communicate with similar stations in the United States and Europe. It must have one installation for emission of sustained waves served by high-frequency alternators and another for the emission of damped waves to communicate with wireless stations not provided with the system of sustained waves.

Alternating, tri-phase electric current now distributed at 190 volts and 50 cycles is available, but the plant must have a reserve motor.

Bids should show the general plan of the installation and detailed plans and cuts necessary to give a complete idea of the work; a general description of the machines and of their operation; time required to complete the work and the detailed and total cost. The government will pay quarterly, according to the progress of the work, reserving 10 per cent of each payment until final completion. Bidders must undertake to manage and operate the plant for six months after completion. Bids should not include the cost of transmission lines for the current nor of telegraph lines to Caracas.

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# THE MORKRUM PRINTING TELEGRAPH SYSTEM

## FULL DESCRIPTION OF OPERATION

Third Article.

( *Continued from November* 16 *issue.*)

When the shoe holder revolves, the pressure of the shoes against the friction drum attached to the receiver sleeve, causes the sleeve, and thus the receiver brush to revolve unless it is held by the armature of the start magnet.

when the magnet is de-energized the retractile spring on the armature causes it to press upward against the stop cam.

When the cam revolves in the direction of the arrow, the stop armature (which is pressing against

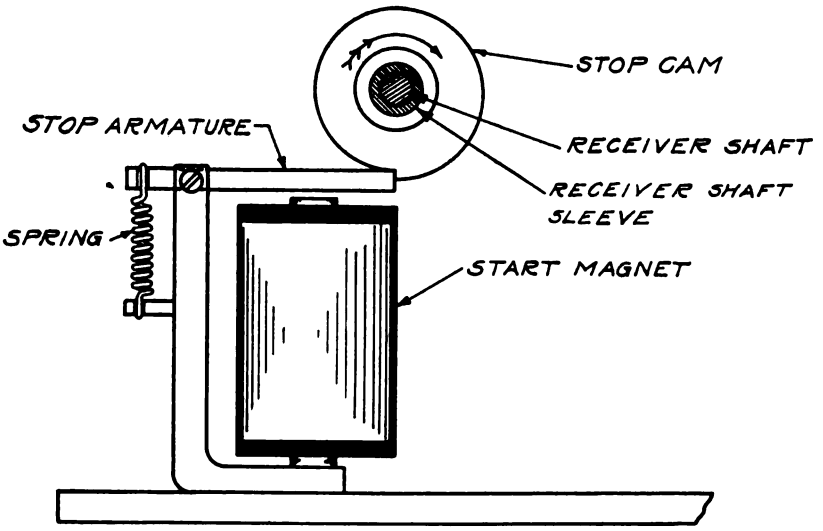


FIGURE 22. STOP AND START MAGNET.

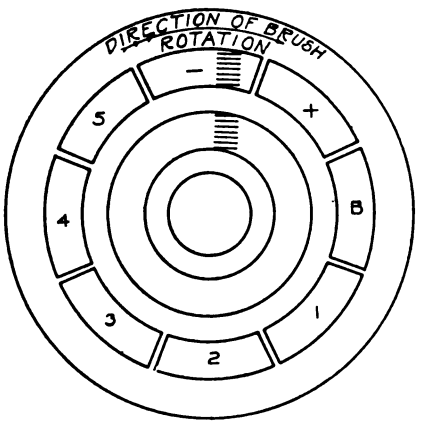


FIGURE 23. TRANSMITTING COMMUTATOR

*Stop Cam and Start Magnet.*—Mounted about midway on the receiver sleeve is a notched wheel or cam, known as the stop cam, and mounted directly below this cam, on the base of the distributor is the start magnet. The stop armature controlled by this magnet is pivoted in a horizontal position, so that

the cam) will at a certain point rise into the notch of the stop cam. This will arrest the rotation of the cam and the receiver brush, but the receiver shaft and shoe holder which is attached to the shaft, will continue to revolve, the shoes slipping on the surface of the friction drum.

*Transmitting Commutator.*—In the elemental description of the transmitting commutator the outer ring was referred to as being made up of only five segments corresponding to the five intervals of the code. In practice, eight segments are used. Five of these segments correspond to the five intervals of the code. The sixth and seventh are permanently connected to negative and positive battery, respectively, and are used for sending out two fixed impulses, which control the start magnet at the distant end. The eighth segment is used to control a break signal.

The two control segments which are permanently connected to negative and positive battery are so located on the transmitting commutator that the transmitter brush will pass over them immediately after the fifth selecting segment.

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The continuous inner ring is connected to line and as the transmitter brush revolves it connects the segments of the outer ring successively to the inner ring.

*Start Magnet Operation.*—It is necessary for the receiver brush and the transmitter brush at opposite ends of the line to be always on corresponding segments. This is accomplished in the following manner:

As stated before, there are two segments on the transmitting commutator, which are permanently connected to marking and spacing battery, and which send out to the line each revolution, two impulses known as the resting and starting impulses, respectively.

During the transmission of the resting impulse, the receiver brush is held stationary by the stop armature and stop cam, and the friction clutch slips. The transmission of the starting impulse, however, causes the tongue of the main line relay to move over against its spacing contact.

Thus it is seen that the reception of the starting impulse energizes the start magnet, which withdraws the armature from the notch in the stop cam. This allows the receiver brush to make one revolution when its movement is again arrested until the reception of the next starting impulse.

*Motor Governor.*—In order that the motor which drives the distributor shafts may maintain a constant speed, it is provided with a fly-wheel and governor. The governor is of the fly-ball type. When revolving, the pull of the governor weights tends to open the governor contacts. The speed at which the contacts are opened is determined by the position of the adjusting screws.

The circuit from the local battery to the motor passes through a 1000 ohm resistance, which is shunted by the governor contacts. When the governor contacts are open, this resistance is in series with the motor, which immediately slows down. The slowing down of the motor allows the

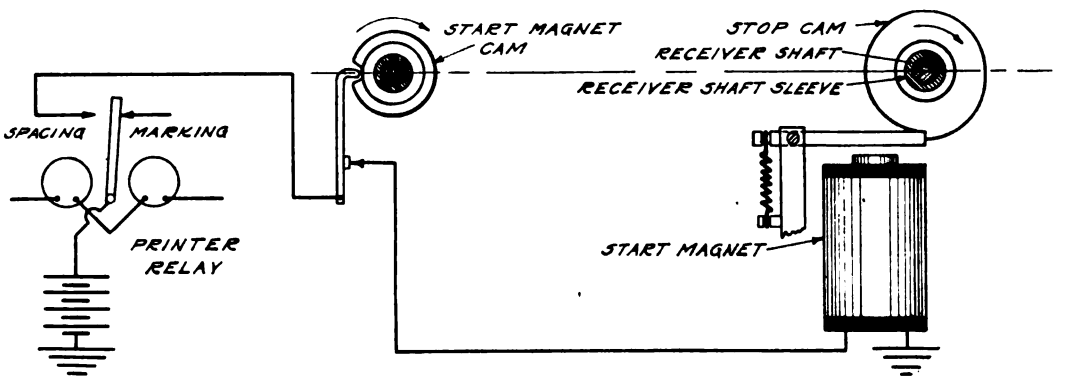


FIGURE 24.—START MAGNET CIRCUIT.

The spacing contact is connected to a contact brush controlled by a cam on the receiver sleeve, which is known as the start magnet cam. This cam allows the contact brush to press against its contact screw at the time when the receiver brush is at the top of the receiving commutator, and being held stationary by the stop cam.

Since the line relay tongue is now against its spacing contact, the start magnet will be energized and will pull the stop top armature out of the notch in the top cam, and allow the receiver brush to rotate.

After the receiver sleeve has revolved a slight distance the start magnet cam will open the start magnet contact, de-energizing the magnet. When the magnet is de-energized the retractile spring of the stop armature will cause the armature to move upward against the stop cam. When one revolution of the receiver sleeve has been completed, the notch in the stop cam will again be in such a position that the stop armature will rise into it. This will arrest the rotation of the receiver brush again until the next starting impulse is received, when the armature will be withdrawn, and the cycle of operations repeated.

contacts to again come together, thus shunting the resistance. The motor speed will then increase, and cause the contacts to open again. Thus it is seen that the speed is kept constant by the opening and closing of the governor contacts. The contacts will be held open longer if the speed tends to increase, and closed longer if the speed tends to decrease. This allows a wide variation of voltage and changes of load, without a change of speed.

*Receiving Commutator.*—The receiving commutator consists of two concentric metal rings set in insulating material. The inner or smaller ring is a continuous one. The outer ring is cut into thirteen segments, which are insulated from each other.

Referring to Figure 26, the segment marked B is connected to the break signal relay, The segments 1, 2, 3, 4, 5 are connected to the five selecting magnets in the printer. The segment marked 6 is connected to the operating or sixth pulse relay in the printer.

Segments 1A, 2A, 3A and 4A are joined together and connected to the tie-up lamp in the printer, the operation and function of which will be explained later. The segments between B and 1, 5 and 6 are

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dead segments, and have no function except to properly space the other segments.

The continuous inner ring is connected to the marking contact of the printer relay. The brush arm attached to the receiver sleeve carries two brushes, one of which bears on the inner ring, the other on the outer segmented ring. Thus, as the brush arm revolves, the segments of the outer ring are connected successively to the inner ring, and through it to the marking contact of the printer relay.

the receiving commutator are shorter than the corresponding segments of the transmitting commutator.

The receiving commutator is movable and can be rotated a considerable distance in either direction. The ideal position of the segments of the receiving commutator is the position where the brush passes over them during the middle of the received marking impulses.

Because of the small amount of the received impulse required to operate the selecting magnet it is

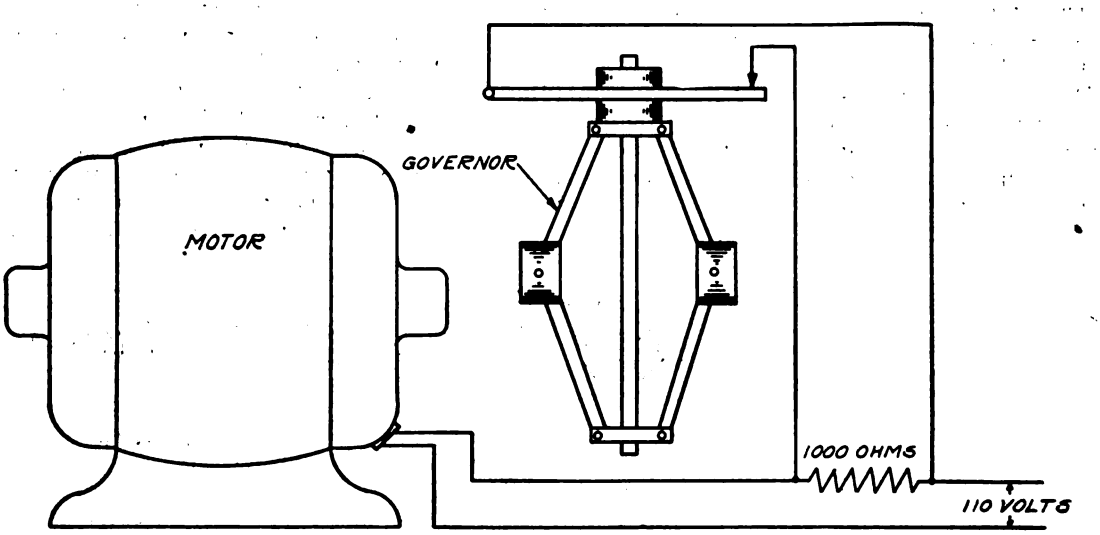


FIGURE 25. MOTOR GOVERNOR CIRCUITS

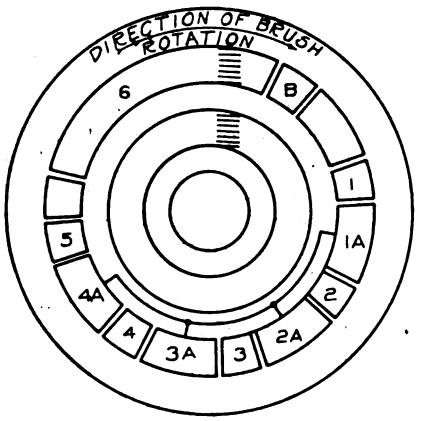


FIGURE 26. RECEIVING COMMUTATOR

It has been stated before that the receiver brush revolves eight per cent faster than the transmitter brush. However, the spacing of the segments of the receiving commutator is such that the time required for the receiver brush to pass from one selecting segment to the next, is the same as the time required for the transmitter brush to pass from one selecting segment to the next.

The whole of the received marking impulse is not required to operate the corresponding selecting magnet. For this reason the selecting segments of

possible to rotate the receiving commutator considerably, and still have the received marking impulses fall on the proper segments. The limit of movement in one direction would be where a marking impulse instead of falling on its proper segment would fall partially on the preceding segment. The limit in the other direction would be where the impulse falls partially on the segment succeeding the proper segment.

In practice the process of finding these limits and setting the receiving commutator in the most favorable position is known as orientation or "taking the range."

Since the selecting segments of the receiving commutator are so much shorter than those of the transmitting commutator, as long as the receiver brush is passing over a segment during some part of the corresponding received marking impulse the corresponding selecting magnet will be operated properly. Therefore, a considerable amount of speed variation can exist through which the signals will still be received properly.

In case the receiver brush revolves at a rate of speed slightly lower than normal, the length of time during which the brush is held at rest by the stop cam is shortened. If the brush is revolving at a speed higher than the proper speed the brush will remain at rest a longer period of time. Thus it

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will be seen that the receiver brush starts its revolution in true relation to the transmitter brush at the distant end, and the stop mechanism takes care of any speed variations between the home and distant motors by holding the brush at rest a longer or shorter interval of time.

As the start of each revolution of the receiver brush is controlled by the reception of the starting impulse from the distant end, even though the speed of the receiver brush may vary from normal the receiver brush and the distant transmitter brush will still be upon corresponding segments for the short duration of one revolution unless the speed variation is very great.

*Break Signal.*—Segment B of the transmitting commutator is connected to the tongue of the break key. The contact of this key against which the tongue normally rests is connected to positive or spacing battery, while the contact against which the tongue is held when the key is depressed is connected to negative or marking battery.

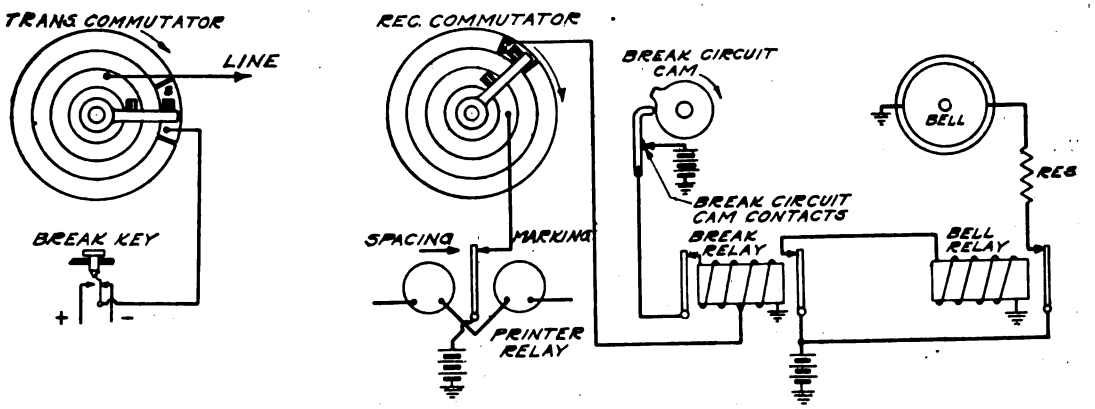


FIGURE 27. BREAK SIGNAL CIRCUITS

If the break key is depressed, negative battery will be sent over the line when the transmitter brush passes over segment B, and the receiving polar relay at the distant end will move its armature against the marking contact. As the receiver brush will be passing over segment B of the receiving commutator at this instant, battery will flow from the tongue of the relay through the segment to the coil of the break relay causing this relay to operate. When the left hand tongue of this relay touches its front contact, it connects battery from the break cam contact through both windings of the break relay, thus locking it in operated position. The right hand tongue of the break relay is connected to battery and when it touches its front contact, it connects battery to the magnet of the bell relay which operates and rings the bell.

It will be seen that both the break relay and the bell relay will be held operated until the break cam revolves far enough to open the break contacts, cutting off the locking battery. The position of the break cam on the receiver shaft is such that the break contacts are opened shortly before the brush reaches segment B.

The break relay is a quick acting relay, while the bell relay is a slow acting relay. Once during each revolution the break cam opens its contacts and if the break relay be operated, cuts off its locking battery and allows it to return to unoperated position. The bell relay being a slow acting relay requires an appreciable length of time to de-energize. Thus, if the break key at the transmitting end is held depressed, immediately after the break cam cuts off the locking battery from the break relay, the brush will pass over segment B and again operate the break relay. The period of time from the opening of the break cam contacts (de-energizing the break relay) to the operation of the break relay again when the brush passes over the B segment is so short that the bell relay has not had time to return to unoperated position. Therefore, the plunger of the bell has been held in operated position and the bell does not ring again.

From the above it is obvious that only one stroke of the bell will be given for each depression of the break key regardless of the length of the depression, so that in order to ring the bell a number of times, it is necessary to depress the key, let go and depress again for each stroke of the bell desired.

*(To be continued.)*

"Cultivate individuality. Initiative and common sense, backed up by moral courage to do the thing that should be done at the time, is more valuable now than ever. The call comes to those who have demonstrated their ability to do things."

—EDWARD REYNOLDS.

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# LAYING A DEEP WATER SUBMARINE CABLE IN PUGET SOUND

The great increase in the volume of traffic resulting from the late war recently made it necessary to install additional long-distance telephone circuits between Seattle and the United States Navy Yard at Bremerton, Wash.

On account of the importance and long-haul character of the business conducted by the navy yard, it was imperative that the circuits in the new cable be of the very highest quality, and a specially designed cable was manufactured for the purpose.

This cable when finally assembled for laying was 18,000 feet long and weighed eighty-one tons, that is, at the rate of nine pounds per foot of length. It was made up of twenty-four quadded pairs of No. 16 gage paper insulated copper conductors enclosed in a lead sheath nearly one-quarter inch thick. This sheath was protected by an armor of twenty-four No. 4 gage steel wires wound spirally over a jute cushion and covered in turn with two layers of jute, making the complete cable two and three-eighth inches in diameter.

The distance between Alki Point and Restoration Point at the crossing was 15,460 feet, air-line distance, and a study of the bottom profile at this location showed a depth of 800 feet within a mile of Restoration Point, the western shore, which rose to a depth of 700 feet at a point about three-quarters of a mile from Alki Point, the eastern shore.

At no other location is there a paper insulated cable in water so deep, so with this size and weight of cable, together with the effect of tide and wind interference, it was at once obvious that the situation was unique.

Briefly stated, the problem was the steering of an accurate course with powerful tugs towing a barge carrying the cable, with means for paying it out at the proper speed and under sufficient tension to insure an even lay.

The equipment as finally assembled for the purpose consisted of two tug boats aggregating 700 horse-power; a barge 110 feet long by 40 feet wide, carrying the cable reel, its brake mechanism, and a donkey engine near the forward end; a payout sheave at the aft end; and a timber runway to support the cable between the reel and the payout sheave.

The donkey engine was installed for the purpose of winding the cable from the shipping reels—three in number—on to the single heavy reel carried on the barge, and means of gearing it to the reel were provided for this purpose. This cable reel, 9 feet long by 12 feet in diameter, was of very heavy construction to withstand the tremendous strains incident to laying, and was mounted to revolve on a heavy shaft supported by a massive timber framework.

When first secured, the reel, which had been used on other cable laying jobs, in shallower water, was provided with a single friction band brake, similar in principle to those used on automobiles but much larger, geared to it through a pinion shaft in the ratio of about 16 to 1. It was determined, however, that a tension of about ten tons would be required when laying this cable at the 800-foot depths and it was therefore decided to provide two additional friction brakes and one electric brake to retard the cable reel to a point where the drag of the tugs would produce this tension in the cable.

One of the additional friction brakes, which, like the original, was simply a lined steel band operated by a hand-wheel causing it to grip the rim of a rotating element, was also geared to the cable reel through a second pinion shaft. The other was applied to a drum 8 feet in diameter mounted directly on the end of the cable reel.

The electric brake consisted of a 100 horse-power electric generator which was geared to the cable reel in such a manner that, as the cable payed out, the generator was driven by the reel and the electrical energy thus produced was dissipated in heating iron resistances just as is done in an ordinary electric heater. Separate excitation was given the generator field by means of an electric vehicle type storage battery, and drum controllers similar to those used on street cars were provided to regulate the field current and the output current of the generator. By this means the latter was regulated to take about half of the total brake load and thus reduce the necessary pressure on the friction brakes to a point where they gave their smoothest operation. It further provided automatic governing effect in response to every tendency toward change of speed of the cable reel.

It was estimated that about 200 horse-power was liberated by the cable reel when in motion under greatest tension, and, as about half of this energy appeared as heat in the friction brakes it was necessary to provide a means of keeping them cool, so water pumps and piping were installed for this purpose.

The payout sheave consisted of a heavy fabrication of structural iron designed to support the cable on seven grooved iron rollers in an easy bend toward the water, thus minimizing the stress on the cable at this important point.

In connection with the wooden runway, which was placed between the reel and the payout sheave, heavy timbers were so arranged that they could be used as levers to bear down on the cable itself should an emergency make it desirable to stop and hold the cable.

In order that an indication might be had of the

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length of cable payed out at any time, a wooden wheel 10 feet in circumference was placed where it would contact the cable and rotate as the latter passed over it. An electrical contact on this wheel was provided to actuate a service meter connected therewith, thus recording the revolutions of the wheel, each count therefore representing 10 feet of cable payed out.

Having thus provided means of paying out the cable under proper tension and of measuring it, the problem of steering the course and checking up the performance of the payout equipment was solved as follows:

Six buoys made of barrels were anchored to concrete blocks sunk at points on the course about 2,000 feet apart. The position of these buoys was accurately determined by triangulation from the shore, and a table was prepared that showed how much cable should be payed out when the barge was opposite each of the buoys. In computing this table, the contour of the bottom and the sag of the cable from the barge to the point where it reached bottom several hundred feet astern had to be taken into consideration. If, then, the payout meter showed that the amount of cable payed out at any buoy was greater than called for by the table, it would be an indication that the cable was being payed out too fast and that additional tension was required.

On the day selected for the laying, the start was made from Alki Point just before high tide so that the barge could be brought close in to permit the end of the cable being taken ashore and made fast. It was also timed so that as much as possible of the crossing could be made during the period of slack water.

The actual running time required to lay the cable was 45 minutes, but, unfortunately, on account of a factory defect, it was necessary to pick it up again, repair it, and relay it.

On the first trip across, some trouble was caused by the failure of a defective link on the large drum brake, but on the second crossing the equipment operated smoothly, as shown by the fact that the payout meter registered 13,880 feet at the last buoy, while the predetermined amount as shown by the table was 13,900 feet.

One of the interesting details of the job was the method of splicing the cable.

After the conductors had been spliced in the usual manner and a lead sleeve wiped in place, the hump caused by the sleeve was tapered off by wrappings of rubber tape. The splice in the armor was then made at a point about five feet from the cable splice, thus securing flexibility and minimum size. The feature of this splice was the use of iron collars about three inches long which were slipped over the cable before splicing and to which the individual armor wires were afterwards spot-welded with an oxygen-acetylene apparatus.

Two of these collars were used at each splice, the armor from one end of the cable being welded to one of the collars and the armor from the other cable end being welded to the other collar. The two collars, which were provided with a groove and tendon joint, were then rotated in opposite directions by means of a suitable wrench, and, in this way, the spiraling of the armor was restored and the collars were then pulled together and welded while the armor was under tension. In this way it was made certain that the strain of laying would come on the armor and not on the cable, as might have been the case with other methods.

In order that the electrical condition of the conductors might be under test observation during the laying operation, a number of conductors were brought out from the reel end of the cable and terminated on slip rings mounted on the reel shaft. Electrical connection was secured by means of brushes contacting on the slip rings. The same means was also utilized to provide telephone connection with the shore. Conversation was actually carried on with San Francisco through the entire length of the cable while it was being placed.

The cable was laid by the engineers of the Pacific Telephone and Telegraph Company.

## Green Clerks Are Best.

W. B. Schreiber, manager of the Forty-fifth Street, New York, office of the Postal Telegraph-Cable Company, after long experience in organizing telegraph office clerical staffs, in the course of time reached the conclusion that the most satisfactory service to the company and to the public is rendered by clerks trained to the conditions existing in a given office. In other words, Mr. Schreiber believes that an intelligent, although inexperienced, clerk is to be preferred to a long experienced clerk transferred from another office, the theory presumably being that it is easier to learn than to unlearn.

Following out his ideas in the matter, Mr. Schreiber asked the superintendent to send him a green clerk. That city manager McDermott clearly understood the requirements is evidenced by the fact that on the following day a bright young lady called at the Forty-fifth Street office and handed a letter of introduction to the manager.

Mr Schreiber inquired as to the girl's name and learned that it was Nellie O'Hanlon.

Then, in order to determine whether she had been transferred from another office, he asked:

"Where did you come from, and when?"

Miss O'Hanlon replied:

"From Ireland, last week."

Latest reports from the 45th Street office are to the effect that although Miss O'Hanlon is green in a Hibernian sense, she has entirely discarded all traces of that hue in a business sense.

THE OLD WIRE CHIEF says: "There are those who, when they desire to heap the last degree of anathema upon the head of friend or foe, charge them with possession of the particular unworthy characteristics which they themselves possess."

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## FIRST USE OF THE TYPEWRITER IN TELEGRAPH SERVICE.

The legion of those who were "first to use the typewriter" has grown in numbers, the equal almost of those who were first to discard the tape and read by sound.

Occasionally, when we refer to an old-timer as having been the first man to use a "mill" in a certain office, by return mail we are informed that the card index must be wrong; that the writer of the protest, or his grandfather, in realty was the real aboriginee.

Almost every large telegraph office has its legends, its traditions, and its actual history; but the instances are rare where today may be found in an office an employee who has remained in one place fifty years. When a home-guard of this sort is located the chances are he has not in the past been sufficiently interested in the future to card index current events, and he will tell you that he is "not much for dates."

In a given office its history is very much a matter of hearsay. The complete historical records of any large office are distributed over the entire country and consist of the recollections of old-timers many of whom are now engaged in non-telegraphic occupations, or living with their grandchildren. Some time ago we listened to an authentic account of the early history of Toledo, Ohio, Western Union office, related at an accidental gathering of old-timers in New York. On another occasion a few of the New Orleans "originals" found themselves in Chicago at the same time, when early—and unwritten—New Orleans history was reviewed.

Perhaps it was humanly unthinkable; but it would have been a fine thing if each large and medium sized telegraph office had from its opening day kept a chronological written record of the main events in its history, including the signatures of the successive chief operators, their dates of service, and by all means, the date the typewriter first sounded its portentous click in the office, with the name of the pioneer telegrapher who was willing to brave the jeers of his companions—all expert penmen—by lugging in a printing press.

Who was the first telegrapher to use a typewriter in a given office is a secondary matter to who was the first telegrapher to use a typewriter in any office. The story has been told before, but in view of the number of times recently we have been asked the question as to who was first, what machine was used, and where, we can do no better than quote from an article on the subject written by Mr. A. C. Reiley, of New York, about twelve years ago.

Mr. Reiley said:

"Typewriting and shorthand have been called the twin arts. Doubtless to the commercial stenographer, who knows the typewriter only in its relation to shorthand, this may seem like the merest truism. But to the telegrapher, who knows the typewriter on another side entirely, this common figure of speech brings some interesting reflections. Typewriting may be the twin of shorthand, we hear him say, but it is also the twin of telegraphy. This is certainly a case of very mixed relationship for it thus appears that typewriting is, at one and the same time, the twin of two different arts having little or no relation to each other. This way of putting it simply serves to illustrate most forcibly the universality of the writing machine and the many and widely different fields in which it has made itself an essential factor.

"In claiming special kinship and twinship with typewriting the art of telegraphy has some prior claims which will bear the test of any scrutiny. The relation which exists to-day between typewriting and telegraphy was not an afterthought as many have supposed; on the contrary, it dates from the birth of the typewriter. Indeed, it dates from a time before the commercial birth of the writing machine. For the machine before it ever appeared on the market had already been marked out and singled out for the indispensable part which it now plays in connection with telegraphy. We suppose this fact will come as news even to many telegraph operators, therefore the early history of the typewriter in connection with telegraphy should be of great interest to them.

"The year 1873 witnessed the commercial birth of the typewriter, for it was in that year that the Remingtons undertook the manufacture of the original typewriter.

"However, no less than five years earlier, namely, in 1868, the machine which then existed only as an experimental model in the hands of its inventors, attracted the attention of a well-known telegrapher in the employ of the Western Union Telegraph Company, Chicago, who foresaw with prophetic vision its importance to his craft. This telegrapher was E. Payson Porter, and the mention of this honored name at once brings up one of the conspicuous figures in the history of telegraphy. Mr. Porter was the pioneer "mill" operator. He was not only the first to use the machine, but he also pointed the way for its adoption to the other members of his craft.

"When Mr. Porter, in 1868, for the first time saw and operated the typewriter, he astonished the inventor by the rapidity with which he manipulated the keys of the machine at first sight. His skill was due to the fact that he had formerly worked a "House" telegraph printer.

"During an interview with the inventor, C. L. Sholes, of Milwaukee, in 1869, Mr. Porter was promised the handsomest typewriter that could be manufactured upon condition that he could copy successfully from the telegraph. When the machine came, and after a few days of practice, he took it into General Stager's office. A sounder and key were placed upon the table and the General was the first to manipulate the same. Colonel Lynch then attempted to 'rush' the receiver, and failing to do so, an 'expert' sender was sent for from the operating room. A thorough trial resulted so satisfactorily that the typewriter was taken into the operating room."

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THE MANUFACTURE of lead covered cable was begun in the year 1880.

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# CENTRAL AND SOUTH AMERICAN TELEGRAPH COMPANY MOVES INTO NEW HOME

Equipped with the very latest automatic devices for the rapid and accurate transmission of cable messages, the "All America Cables" new building, at No. 89 Broad Street, was opened October 6, for the handling of telegraph correspondence between North, Central and South America. Firms and individuals in this country doing business with Latin America attach a great deal of importance to the formal completion of the new structure and its expensive equipment, because the event marks a notable epoch in the history of cable service between the three Americas.

No 89 Broad Street, New York.

Officials of the company say that, only by the most persistent efforts has it been possible, on account of war conditions, to erect this up-to-date building which houses not only the two duplex cables connecting New York with the Central and South American Republics, but provides ample room for the new extensions into Brazil, which it is expected will be in operation within a few months. Situated in the heart of the importing and exporting, shipping and banking district, the structure is the first large office building to be erected since the great war began. In spite of stringent government regulations, the scarcity and high cost of materials and labor, the company, feeling the urgent need of greater

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facilities to take care of the constantly growing demands upon its system, undertook the erection of the building during the height of the war excitement.

It is said by patrons of the company that the dependence of all social and commercial intercourse of the three Americas upon the "All America Cables" was so keenly realized during the recent war, that it is unnecessary to point out what might have been the consequences had the United States and Latin America been forced to depend upon cable communication routed via Europe. Direct cable service between the three Americas not only remained uninterrupted, but the service was greatly improved and extended at a time when there was a tremendous demand for all kinds of American goods from importers and exporters in Latin America.

In addition to providing the latest devices for receiving and sending cable messages, the new building permits the bringing together under one roof of all departments formerly located on various floors at No. 64 Broad Street and 66 Broadway.

Founded in 1879 by the late James A. Scrymser, who began laying the first cable from Galveston, Tex., toward Central and South America in 1881, the development of the system to the present time, so closely linked with the trade growth of this country and the republics to the South, is regarded as a tribute both to the enterprise of its founder and to the progressive spirit of those who have been long connected with it.

Cable communication between the United States and South America, in the early days, involved handling by three companies, the "All America Cables," the West Coast Telegraph Company, and the Transandine Telegraph Company, the latter operating the lines accross the Andes Mountains from Valparaiso, Chile, to Buenos Aires, Argentina. Despite strenuous opposition from not only the connecting companies, but also from merchants themselves, who were obsessed with the idea that reduced rates would encourage needless competition in their business, "All America Cables" system graduually reduced the rates, even to the extent of bearing the proportion of reduction that should have been borne by the connecting companies.

When the American company was able to extend its own cables to Valparaiso, and later to build its own lines between Valparaiso and Buenos Aires, it was possible to institute a through service from the United States to Argentina, connecting all the intervening South American republics, and establishing a rate which was the forerunner of the company's policy from that time to the present; i.e., the reduction of rates whenever possible, for the building up of trade relations in the two hemispheres. In pursuance of this policy, the latest reduction in cable rates made in November, 1917, was notable as being the only instance of its kind during the war. Not unnaturally, this reduction caused much comment.

The "All America Cables" has developed from a single cable working in New York City, in 1907, to the present two duplex cables operated from New York City and connecting all South American countries by means of a thorougly modern system of cables, equipped at enormous cost with the latest inventions in mechanical impovements in order to insure the maximum of speed with the mimimum of error.

The "All America Cables" first repair ship, a small merchant vessel of 400 tons, originally named the *Duchess of Marlborough,* and rechristened the *Mexican,* has been replaced by two specially built cable repair ships equipped with the latest devices, one of which the *Relay* (1180 tons), is stationed at New York, and the other, the *Guardian,* (1750 tons), at Callao, Peru. Both are ready at short notice to proceed to any break that may occur, and sometimes repairing breaks at a depth of 3,000 fathoms (18,000 feet). Shortly before the armistice was signed, at a time when one of these vitally important links in the commercial and political relations of the Americas was interrupted in the Atlantic Ocean, it was repaired within forty-eight hours, although the presence of enemy submarines in the immediate neighborhood was common knowledge.

Perhaps no other telegraphic service presents a more interesting or fascinating history than that of the "All America Cables," whose lines cover 18,000 miles. This is the only completely All American system, enabling the various governments of South America to correspond freely with the United States in perfect reliability and security. As an agency for improving the commercial and friendly relations which this country so earnestly desires to foster among its Central and South American neighbors, it would be impossible to overestimate the value of this modern system of intercommunication.

The condition brought about by the world conflict taxed the company's facilities to the utmost, but under the guidance of its President, Mr. J. L. Merrill. and his able staff of experts, a service has been maintained, the efficiency of which is attested by appreciative comments of its patrons almost daily.

## Submarine Cable Testing.

We have received a supply of "Darby and Fisher's Students' Guide to Submarine Cable Testing," fifth edition, one of the most popular books on this important subject.

The book contains 240 pages and deals with all tests and measurements made in modern submarine cable practice. An appendix is included which contains answers to all questions presented in the main work.

The price of the book is $4.50 and copies may be had from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

WILLOUGBY SMITH, in the year 1879, suggested the use of distributed inductance coils along cables to increase the speed of telegraph transmission.

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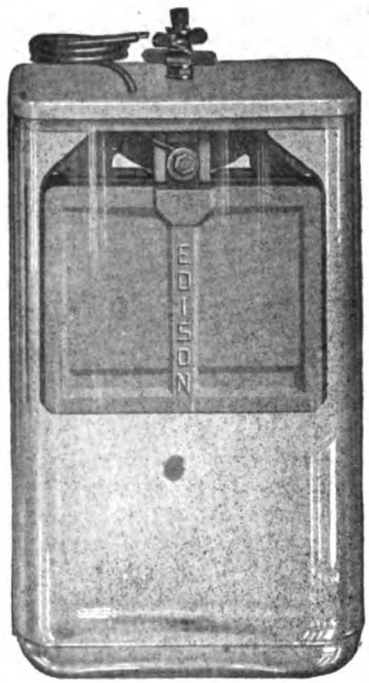
# FOR CLEAR TRANSMISSION

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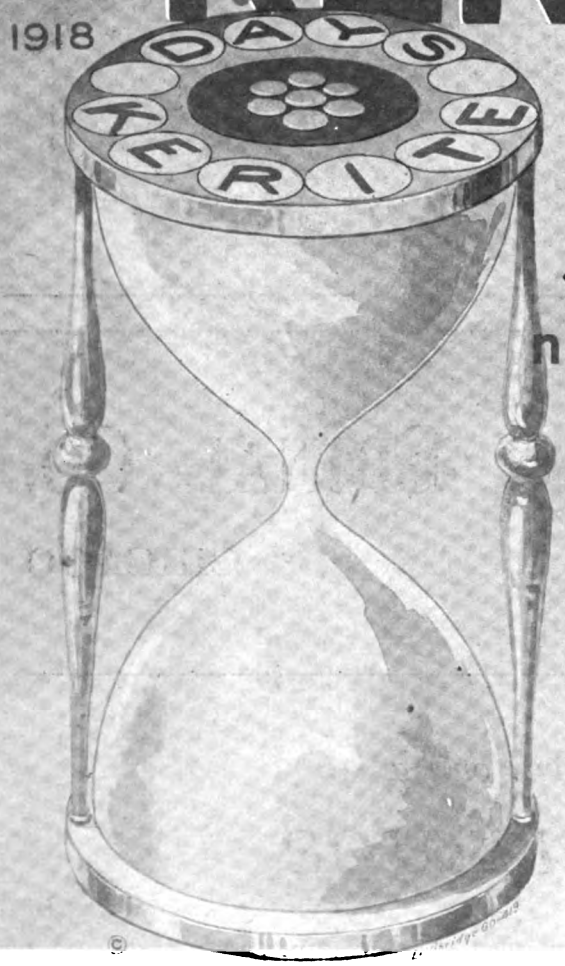

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# THE RAILROAD
## TELEGRAPH AND TELEPHONE

### Convention of the Telegraph and Telephone Division, American Railroad Association, to Be Held in Chicago, December 3, 4 and 5.

In our November 16 issue we gave an outline of the various committee reports to be presented at the December meeting of the Telegraph and Telephone Division, American Railroad Association.

Reports received indicate that the meeting will be well attended by railroad telegraph executives from all parts of the country.

At the meeting in New York of the Committee of Direction, held on October 16, the following Rules for Committee Work were adopted. The care exercised in framing these rules will have far-reaching good results. Heretofore, committee chairmen had no set rules to guide them in carrying on the various divisions of the work during the year, and there was no established procedure governing the presentation of reports at meetings and conventions. The rules now in force will greatly facilitate the compilation of reports and will enable the chairmen of the periodical general meetings to speed the consideration of and the action to be taken on technical reports.

The Rules adopted at the meeting of October 16 are given herewith:

1. It shall be the duty of the Committee of Direction to see that the general Rules for Committee Work are followed.
2. As soon as practicable, after each annual meeting, the Committee of Direction will appoint the committees, designate the chairmen and vice-chairmen, and will assign to each committee the important questions which should preferably be considered during the current year.
3. Committee chairmen may appoint sub-committees designating the chairman thereof.

(a) Calls for all meetings, ordinarily, shall be issued by the secretary.

4. Each sub-committee shall promptly report all of its meetings, conferences and other procedure, in the form of minutes to the chairman, to each member of the full committee and to the Secretary of the Division.
5. Each committee shall promptly report all of its meetings, including meetings of sub-committees, conferences and other procedure, in the form of minutes, to the chairman of the Committee of Direction.
6. Minutes shall be typewritten on 8" x 10½" sheets, with 1½ inch margin on left of sheet for binding.
7. At convenient times, one or more meetings of the full committee shall be held, at which all matter presented by sub-committees shall be considered and put in shape for presentation to the Division.
8. When the chairman of the committee or sub-committee is succeeded by another member, the retiring chairman shall transmit to the new chairman the file, so that the work of the committees may be continuous.
9. Committees are privileged to report, as information, to the Division, the result of any special study or investigation they may deem of sufficient importance to warrant presentation.
10. Committees will complete data and information and, if desired, the Secretary will issue general circulars of inquiry, which should be brief and concise. Reply blank shall specify to whom it shall be returned and shall be in duplicate so that a copy can be retained by the person replying.
11. Committees may, when they so desire, consult with commercial companies, which may or may not be affiliated members, in the preparation of specifications, designs or reports. For this purpose, commercial companies may be invited to send representatives to attend meetings.
12. Each committee shall transmit to the chairman of the Committee of Direction its recommendation of subjects for the following year's work, not later than September 1st of each year.
13. Committees shall review annually the subject matter within their jurisdiction, contained in the Manual of Recommended Practice and recommend such changes as appear to be necessary. Changes shall not be recommended without good reason.
14. Committees shall review the previous work of the Division on subjects assigned to it, and, if in doubt as to procedure, shall apply to the chairman of the Committee of Direction for instructions.
15. In the preparation of rules, regulations and specifications, each committee shall consult with other Sections and Divisions of the American Railroad Association, obtaining from them such matter as they have relative to the subject being considered and endeavor to adopt or reconcile what is proposed with what is in existence so as to avoid conflict, arranging through the chairman of the Division for such co-ordination as may be necessary.
16. Where there appears to be conflict between the work in progress or previously completed, or in assignments to committees, chairmen shall confer with the chairman of the Committee of Direction.
17. In the preparation of a committee's report, a brief history of the subject matter under discussion, with an outline of its origin and development may be given.
18. If necessary, to make clear the connection between the work of the current and preceding years, the previous report shall be reviewed and action thereon stated. Reference to the Manual of Recommended Practice and to the Proceedings shall be given.


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19. Subjects presented in previous reports on which no action was taken, shall be re-submitted if action is still desired.

20. Phrases or technical terms for which definitions are required, or customary definitions which are unsuited to the meanings of the terms as used in connection with Telegraph and Telephone matters, shall be defined in the report.

21. Electrical terms, ratings, tests, etc., shall conform as far as practicable, to the latest issue of Standardization Rules of the American Institute of Electrical Engineers.

J. F. CASKEY,
Superintendent of Telegraph,
Lehigh Valley Railroad Company,
South Bethlehem, Pa.
Chairman, Telegraph and Telephone Division,
American Railroad Association

H. HULATT,
Manager of Telegraphs,
Grand Trunk, and Grand Trunk Pacific Railroads,
Montreal, Que.
First Vice-Chairman, Telegraph and Telephone Division,
American Railroad Association.

22. Titles and numbers for all drawings, plans, sketches and illustrations shall be applied by the Editing Committee. Complete tracings or other material for illustrations shall be forwarded to the secretary for preparation of cuts.

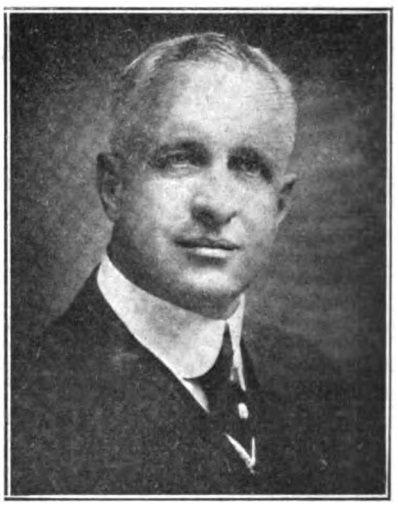
23. Drawings shall be in accordance with form shown on drawing T. & T. 1023.

24. Photographs shall be clear and distinct.

25. Reports for publication transmitted to the secretary shall be in the form of clear, double-spaced typewritten copy, in duplicate on 8" x 10½" heavy letter paper with as few corrections and interlineations as possible. Copy of each report shall be sent to the chairman of the Committee of Direction.

26. Reports with completed rules and specifications or completed sections of rules and specifications may be presented at either the March or September meetings of the Division for acceptance for submission to letter ballot.

27. Completed rules and specifications or completed sections of proposed rules and specifications, adopted by the Division as recommended practice on letter ballot shall be immediately printed and incorporated in the Manual of Recommended Practice for the Telegraph and Telephone Division, with suitable form in which the final approval of the American Railroad Association may be noted when obtained.



W. H. HALL,
Superintendent of Telegraph,
Missouri, Kansas and Texas Railroad System, Denison, Texas,
Second Vice-Chairman, Telegraph and Telephone Division,
American Railroad Association.

28. Reports to be presented at the March meeting shall be filed with the Secretary not later than January 1st and reports to be presented at the annual meeting (September) shall be filed with the Secretary not later than June 15th. No supplementary reports shall be issued without permission of the Committee of Direction.

29. (Form of letter to accompany reports)

30. The method of consideration of committee reports will be one of the following:

(1) Reading by title.
(2) Reading, discussion and action upon each conclusion separately.
(3) Reading and discussion of each item, if so decided by majority vote.

31. Action on each report or section of a report at the March or September meeting will be one of the following:

(1) Acceptance as information.
(2) Recommittal with or without instruction.
(3) Acceptance for submission to letter ballot, as presented.

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(4) Acceptance for submission to letter ballot, as revised.
(5) Acceptance for submission to letter ballot, as presented, for inclusion in the Manual.
(6) Acceptance for submission to letter ballot, as revised, for inclusion in the Manual.

DEFINITIONS.

"Designated Authority" in all rules, regulations and specifications shall mean the Superintendent of Telegraph or other railroad official having jurisdiction.

"Approved Types'," "Approved Methods" and "Approved Equivalents" shall mean types of apparatus, methods and equivalents approved by the Telegraph and Telephone Division or other Sections or Divisions of the American Railroad Association.

## Major E. R. McFarland Returns to Alaskan Railroad.

Major E. R. McFarland, who was more than a year and half with the signal corps in France, has been re-instated to his old position of superintendent of telegraph and telephone on the government railroad in Alaska, now under construction by the Alaskan Engineering Commission.

While in France with the American Expeditionary Forces, Major McFarland was in command of various telegraph battalions engaged in constructing lines connecting the several ports with the great depots and army headquarters with the advance lines. He later organized a telegraph and telephone department for the Transportation Corps in the Service of Supplies and was appointed general superintendent of telegraph and telephone, was promoted from captain to major, and awarded a citation by the commander in chief, A. E. F. He is an old regular army man, and has been reappointed a major in the officers' reserve, signal section.

## Necessity the Mother of Invention.

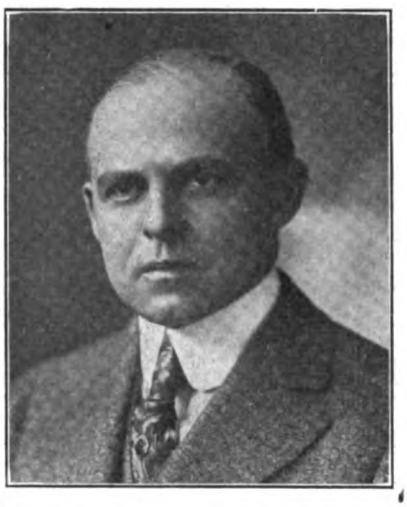
The uses to which ready-made screw holes can be put seems to be endless. The screw holes manufactured by the Stine Screw Holes Company of Waterbury, Conn., although but recently placed on the market, are finding their way into all lines of the mechanical industries. The holes are made to fit all screws, both wood and machine, and they can be used in any material without special tools.

## Where We Go.

TELEGRAPH AND TELEPHONE AGE, twice each month, goes to a number of subscribers in practically all foreign countries. Not only does it reach the telegraph administrations of the larger countries, such as Great Britain, France, Italy, Russia, Germany, etc., but copies are subscribed for by telegraph and cable people in all countries of Central and South America, and in most of the large and small islands in the Pacific, Atlantic and Indian oceans. Our circulation in Canada, Australia, New Zealand, and Japan is quite substantial. Also, we have a rapidly growing list of subscribers in radio telegraph service in all parts of the world.

## M. H. Clapp Goes to Western Union.

Martin H. Clapp, since the inauguration of government control of the railroad systems, manager of the telegraph section of the United States Railroad Administration, and late chairman of the Telegraph and Telephone Division, American Railroad Association, will sever his connection with the Railroad Administration on December 31, next, and has accepted the position of manager of the contract department of the Western Union Telegraph Company, New York.



M. H. CLAPP

During the past twelve years Mr. Clapp has been a positive force for betterment in the management and operation of railroad telegraph departments. As superintendent of telegraph of the Northern Pacific Railroad, Mr. Clapp identified himself with the activities of the old Association of Railway Telegraph Superintendents, taking an active part in the work of that Association. As a reward for his ability and industry along these lines he was elected president of the Association, serving in that capacity until the Association was absorbed by the American Railroad Association and was organized as the Telegraph and Telephone Section of the Division of Operation.

Mr. Clapp brings to his new position a thorough grasp of the telegraph business and a knowledge of railroad telegraph contracts acquired over a long period of years during which he concentrated on these subjects personal energy uncommon even in these days of high individual efficiency.

His many friends in the telegraph and railroad service throughout the United States and Canada will be glad to learn of Mr. Clapp's advancement.

THE OLD WIRE CHIEF says: "A certain man may have the good fortune to have a certain position with a certain company; and, again, a certain company may have the good fortune to have a certain man in a certain position, but it is not the same man."

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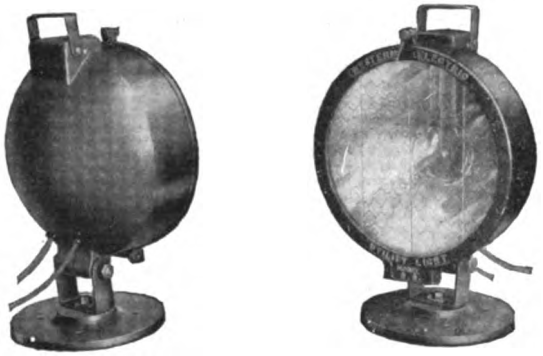
## THE WESTERN ELECTRIC PORTABLE UTILITY LIGHT.

A new type of night light for highly localized lighting has recently been placed on the market by the Western Electric Company. This light, which is to be known as the Western Electric Portable Utility Light. is for use at close ranges where the light is to be located at a distance not greater than 125 feet from the object or surface to be illuminated.

With the light operating on a 100 feet throw, a 100 feet spread is obtained at an angle of sixty degrees.

The unit gives a smooth, white light without gleam or glare. This is made possible by a new development—the hammered glass reflector. A 200 Watt Mazda, Type C, lamp is used.



The unit is of especially rugged construction throughout and will withstand rough usage in service.

The hammered glass reflector is spring suspended in a one piece cast iron housing. The housing is closed by a wire-glass front which is fitted into a recessed cast-iron ring. This forms a door which is hinged at the bottom and secured by a hand latch, thus affording easy access to the interior of the housing. The recess in the ring makes the interior of the housing fully weatherproof.

The lighting unit can be furnished in either a black or gray weatherproof enamel finish. It is 19¼ inches high and weighs approximately 30 pounds. This light weight makes the unit very easy to carry from place to place. The base is 9 inches in diameter, giving the light stability when mounted on a flat horizontal surface. The unit can also be mounted on either vertical or flat surfaces such as walls, poles or roofs, by virtue of a heavy universal joint which fastens the housing to the base.

All adjustments can be made by hand—no tools are necessary.

The Western Electric Portable Utility Light has a wide range of applications. In railroad work it can be used for lighting transfer tables, coaling stations, inspection pits, loading platforms, cranes, roundhouses and drawbridges. On marine work it can be used for lighting docks, dredges, slips, loading operations, canal locks, dry docks and pile drivers. Its industrial applications cover even a wider variety of uses such as lighting shop yards, material yards, well drilling, coal tipples, erecting shops, machine shops, tramways and inclines, conveyors and all kinds of emergency work.

## WIRE CONTROL COST UNITED STATES OVER $14,000,000.

### Burleson's Report Shows Big Deficit After Federal Operation; Receipts From Cables Are Not Included.

War-time operation of the telephone and telegraph systems of the country cost the federal government $14,418,237, according to a report of Postmaster General Burleson, transmitted to congress November 13 by President Wilson.

This sum represents the differences between the net earnings of the companies taken over and the compensation guaranteed by the government.

No figures as to the operation of the cable systems, which were under federal control for six months, were given, Mr. Burleson explaining that the reports from the companies had not yet been received. Any profits from the operation of these companies would reduce the total government deficit, Mr. Burleson said.

Total net earnings of the telephone and telegraph lines during federal control were reported at $70,387,532, while the compensation assured was $83,055,769. The total deficit included an estimated $3,000,000 for settlement of future claims. Small independent companies operated by the government reported a surplus of $57,428.

Reported deficits of the American Telephone and Telegraph Company, operating thirty-six subsidiary companies, were $9,290,170.31, while the Western Union Telegraph Company asked an adjustment of $921,511. The Ohio State Telephone Company of Columbus, Ohio, operating four subsidiary companies, showed a deficit of $392,123.

The government claim against the Postal Telegraph-Cable Company was listed at $2,123,392.

"If the unadjusted claims of the government against the Mackay companies be taken into consideration," said Mr. Burleson, "the estimated obligations of the government would be substantially reduced."

President Clarence H. Mackay, of the Postal Telegraph-Cable Company, wrote a letter to Mr. Burleson declining to send a check for the amount of the postmaster general's claim.

### Radio Buzzer Sets.

TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York, can supply buzzer sets for learning the continental alphabet by means of buzzer signals, the same as heard in telephone receivers used in regular radio working. These sets are equipped with key, high-tone buzzer, and flash lamp signal, complete on one base. The price is $3.50 for the set.

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# Electro-Physics for the Telegraph, Telephone and Radio Student

No. 18.

## Telephone Transmission.

Modern practice in planning telephone installations requires that the engineers in charge of the work decide upon the standard of transmission to be maintained, both as regards local lines and long distance lines. It depends upon the standards of transmission aimed at, what the character of the apparatus, and inside and outside plant must be.

In the last three installments of this series of articles we have considered the various factors which bear upon the efficiency of telephone transmission where the wires forming the circuits are carried individually on pole lines. We shall now go into the matter of cabled conductors, and review the effects upon transmission of substituting cabled conductors in place of open wires.

Elementary consideration of the subject dicloses the fact that it would be impracticable to "cable" wires of No. 9, 8, or 4 gage. The relatively large number of conductors economically desirable in cables necessitates that small gage conductors be used; therefore, the smaller the size of the conductor, the higher will be the electrical resistance per unit length; also, the fact that when cabled the conductors are packed very close together—separated only by thin layers of paper, cotton, silk, rubber, or enamel insulation—the electrostatic capacity will be much greater per unit length of conductor than is the case with open wires on pole lines. Leakage of current from conductor to earth, or from one side of a metallic circuit to the other side, is practically negligible in the case of cabled conductors, while in open line wires leakage is one of the chief factors bearing on transmission efficiency. Further, for practical purposes with wires in cables, the conductor inductance is of importance only in special cases, and ordinarily may be disregarded.

It has been considered good practice to regard the transmission losses in a cable as proportional to the square root of the product of the mutual capacity and resistance. For standard cable this quantity is 2.18, and from this the transmission equivalent of any other cable may be ascertained by determining the value of the square root of the product of the mutual capacity and resistance, and dividing this by 2.18. Consider the case of two separate cables with equal capacity, then the transmission is proportional to the square root of the resistance in ohms, so that the relative transmission efficiencies of the two cables may readily be determined.

Therefore, where it is desired to double the transmission efficiency, without increasing the capacity per mile, it is necessary to use a conductor four times as large.

In the following table are shown the approximate transmission values; that is, the length of various kinds of cables and of open wire having a transmission loss equivalent to thirty miles of cable:

CABLE.

| | |
|---|---|
| No. 22 B. & S. gage .083 mf. mutual capacity.... | 18 miles |
| No. 20 B. & S. gage .074 mf. mutual capacity.... | 23 miles |
| No. 19 B. & S. gage .074 mf. mutual capacity.... | 27 miles |
| No. 19 B. & S. gage .054 mf. mutual capacity.... | 30 miles |
| No. 16 B. & S. gage .074 mf. mutual capacity.... | 39 miles |
| No. 14 B. & S. gage .074 mf. mutual capacity.... | 48 miles |
| No. 13 B. & S. gage .074 mf. mutual capacity.... | 55 miles |
| No. 10 B. & S. gage .074 mf. mutual capacity.... | 77 miles |

OPEN WIRE.

| | |
|---|---|
| No. 14 Birmingham wire gage, iron..... | 75 miles |
| No. 12 Birmingham wire gage, iron..... | 94 miles |
| No. 10 Birmingham wire gage, iron..... | 120 miles |
| No. 12 B. & S. gage, copper..... | 246 miles |
| No. 10 B. & S. gage, copper..... | 353 miles |
| No. 9 B. & S. gage, copper..... | 429 miles |
| No. 8 B. & S. gage, copper..... | 526 miles |
| No 6 B. & S. gage, copper..... | 811 miles |
| No. 8 Birmingham wire gage, copper..... | 857 miles |
| No. 12 New British Standard gage, loaded..... | 909 miles |
| No. 8 Birmingham wire gage, loaded..... | 2.000 miles |
| No. 8 Birmingham wire gage, loaded phantom. | 2,273 miles |


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# QUESTIONS AND ANSWERS

### Telephone Lines.

H. E. E.—When a grounded telephone circuit is connected to a metallic circuit line without the interposition of a repeating coil, any noise from external causes occurring in the grounded section of the line will be transmitted into the metallic portion of the circuit. When a repeating coil is used, very little of the objectionable noise in the grounded line is passed into the metallic circuit. Of course, in case there are disturbing noises in both the metallic portion of the line and in the grounded section, the presence of the repeating coil will not reduce the noise.

### Inductive Windings.

W. W. L.—Induction coils, transformers, choke coils, retardation coils, impedance coils, and repeating coils are, in principle, all very much alike, consisting generally of one or more coils of insulated wire wound on a soft iron core.

The name *induction coil* usually is given to a combination consisting of a straight core made up of a bundle of small, soft-iron wires upon which is wound a low resistance primary winding, on top of which, in turn, are wound a great many turns of very fine wire having a comparatively high resistance. Low voltage direct-current is supplied to the primary and is subjected to a rapid make-and-break by means of a mechanical interrupter. The secondary, induced current, will be of high voltage and of the nature of an alternating current.

A *transformer* may have a straight core, or a circular, or square core of iron wires or of specially formed sheets of iron. The primary winding may be of low resistance, and the secondary of high resistance; or, if the intention is to reduce the primary potential, the primary winding may be of high resistance and the secondary winding of low resistance.

A *choke coil* generally consists of a single winding upon a straight or circular core of iron wires, its inductive properties being taken advantage of to regulate the strength of alternating current flowing through it.

*Retardation coils* and *impedance coils* are practically the same as choke coils. These names are of more recent adoption, and more accurately designate the function of the windings.

*Repeating coils* may have two, four, or more windings upon circular iron cores; the coils may be so connected externally that primary and secondary windings will have equal resistances.

### Biased Relay.

A. S. D.—When it is said that a polar relay used in duplex or printing telegraphy is biased, that means that the armature of the relay has been so adjusted that it will have a tendency to cling to one contact stop, and that it will remain in contact with that stop-screw until the current traversing the magnet winding of the relay is reversed. When the relay armature is properly "centered" it will cling to either the open or the closed stop-screw while no current traverses the coils of the relay, or when currents of equal strength flowing differentially through both relay windings. The relay may be so biased that with equal strength flowing differentially through both relay coils, the armature will cling to the stop-screw on the side magnetically favored; that is, the side with the permanent magnet closest to the armature.

### Morse Speed.

G. L. T.—The number of words straight Morse—all words spelled out—that can be sent with an ordinary key, or semi-automatic transmitter, in one minute is still a wide open subject. It may be that in the future some speedy artist will appear who shall establish a new high-water mark.

In looking over the records of past performances the following authentic figures are disclosed: In the year 1898, at a telegraph tournament, W. M. Gibson sent 254 words in five minutes; in 1902, F. M. McClintic sent 251 ½ words in five minutes; in 1902. Mr. McClintic sent 517 words in ten minutes. By simple division the number of words sent in one minute may be determined. A good sender can send as fast in the fifth or tenth minute as he can in the first minute.

### Lamp Resistances.

M. E. H.—Carbon filament lamps universally used fifteen years ago were rated in candle-power: 8 c. p., 16 c. p., 32 c. p., etc., the current consumption being about three and one-half watts per candle. Thus, a 16 c. p. lamp consumed about 55 watts.

Modern tungsten lamps are rated according to their total wattage per lamp: 25-watt, 40-watt, 60-watt, etc. Using tungsten filaments, the current consumption is about one and one-quarter watts per candle.

With an electromotive force of 104 to 110 volts, the approximate resistance of a 25-watt tungsten lamp is 440 ohms; a 40-watt lamp, 330 ohms, and a 60-watt lamp, 220 ohms.

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### Electric Charge in Submarine Cable.

F. L. D.—When the cable sending key is closed, an electric charge is sent into the cable conductor. If, when the key is opened, this leaves the conductor insulated at the sending end, the charge will not remain indefinitely.

If the electrostatic capacity of the cable in farads is multiplied by the resistance of the cable in megohms, a figure is obtained which is known as the FR of the cable. When the sending key is held closed twenty seconds and then opened during a period of one minute, the loss of charge is 86 per cent, where the FR is 50; 26 per cent, where the FR is 200; 11 per cent, where the FR is 500; 5.8 per cent, where the FR is 1,000; 3.9 per cent, where the FR is 1,500; and 3 per cent, where the FR is 2,000.

### Intermediate Battery.

C. C. L.—When it is said that an intermediate battery is connected in a telegraph circuit, the understanding is that in addition to the main line battery applied to the wire at each of the two terminal stations, an extra, or intermediate battery is also connected in series with the line wire at a station between the two terminal stations; this may be near one of the terminal offices or near the middle of the line. The purpose of the intermediate battery is to increase the current strength in the circuit to a degree that will permit the circuit to be operated at high speed and with strong action of the relays.

### Metallic Circuit Quads.

F. J. S.—The use of two line wires between terminals for the operation of duplex or quadruplex circuits has been resorted to only where serious inductive disturbances from neighboring electric power lines make it difficult to operate single wire grounded circuits.

When two wires are used for the circuit the earth is not used for one half of the main line circuit.

### "S" for "6."

WILLIS H.—In the transmission of messages which contain groups of figures, such as code combinations, car numbers, etc., operators sometimes use the three dots of the letter s to represent a figure 6. The purpose is to save time.

### Composite Coils.

S. H. I.—The coils supplied by the Kellogg Company are No. 55-A for composite circuits, and 18-A for repeating coil and simplex circuits at intermediate stations.

### One Hundred Per Cent Service.

According to a decision of the State Supreme Court of Illinois, telegraph companies operating in that state must give a 100 per cent. service, or they are liable for any damage that may result from poor service. The Court declared null and void the agreement on the backs of telegraph message blanks which senders agree to. The Court held that "the company cannot exempt itself from liability for its own negligence."

### William Noble

ENGINEER IN CHIEF, BRITISH TELEGRAPHS.

William Noble, recently appointed engineer in chief of the postoffice telegraphs of Great Britain, entered the service in the year 1877, serving as a telegrapher in the Aberdeen office during the early part of his career. In 1893 he received appointment as second class engineer, four years later being promoted to the grade of first class engineer in the office of the engineer in chief.

In 1900 Mr. Noble was made technical officer, and rapidly rose to the position of assistant superintending engineer in the Central Metropolitan District, and in 1905 reached the position of first class staff engineer, and was called upon to direct the telegraph section at headquarters.

In 1907 Mr. Noble was appointed superintending engineer of the Central Metropolitan District, devoting himself to improvements in organization, in which work he was eminently successful. He was appointed a member of the superintending engineers' committee which proved to be a prelude to a long series of appointments on various active committees. In recognition of his service in this work he was granted a permanent allowance of one hundred pounds per annum.

In March 1912 Mr. Noble was promoted to assistant engineer in chief, continuing in this position during the trying years of the late war. His recent promotion to the position of engineer in chief of the British Postoffice Telegraphs is a fitting reward for faithful and efficient service well performed over a long period of years.

Mr. Noble is now on a month's visit to American cities, investigating American telegraph, telephone and radio systems and methods.

### Ticker Tape Could Not Keep Up.

The rapid movement of quotations on the New York Stock Exchange on November 13 gave the stock tickers throughout the financial district a pace which they have not had set for them in many years.

Quotations continued to appear on the ticker for forty-one minutes after the close of the market, the longest time of which there is record. When it is remembered that the bonds no longer are carried on the stock ticker, but on a special bond ticker, it will be appreciated how far the ticker was behind the market. At 11:30 it was eighteen minutes behind, and this was increased as the volume of trading grew. As a guide it became useless. Baldwin Locomotive, for instance, was being quoted on the tape at 111, when it was selling on the floor of the Exchange at 108. The same was true of other stocks.

THE OLD WIRE CHIEF says: "Tact is what the other fellow exercises when he successfully disguises the fact that he knows we are making a mess of things."

THE OLD WIRE CHIEF says: "By employing camouflage many a square peg has managed to survive a long time in a round hole."

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# CURRENT EVENTS

## EXECUTIVE OFFICE ANNOUNCEMENTS, PERSONAL MENTION, APPOINTMENTS

### WESTERN UNION TELEGRAPH COMPANY.

NEWCOMB CARLTON, president; J. C. Willever, vice-president in charge of commercial department; W. N. Fashbaugh, vice-president in charge of traffic; George M. Yorke, vice-president in charge of plant and engineering, and Dr. A. H. Doty, of the health department, New York, are on an extended trip of inspection which included visits to many of the large offices throughout the Lake, Central, Gulf, Mountain, and Pacific Divisions. The party left San Francisco on the return trip on November 25, and planned to make stops at Los Angeles, Tucson, El Paso and Dallas.

F. E. D'HUMY, central office engineer, has returned to his office from a business trip which took him to Chicago, Kansas City, and other large terminal offices.

THOMAS W. CARROLL, general manager, Eastern Division, is making a trip of inspection to offices in New York State.

H. A. EMMONS, traffic engineer, has returned to New York from a business trip to Chicago.

I. N. MILLER, Jr., who has been granted an extended furlough from the position of district commercial superintendent, Western Union Telegraph Company, Seattle, Wash., is sojourning at Palm Springs, Calif. Mr. Miller has been in the service of the Western Union Company almost continuously during the past thirty-two years.

JOHN D. MCLELLAND, manager at Houston, Texas, was on October 23 coroneted a thirty-third degree Mason, and Inspector General Honorary. Mr. McLelland has been in the telegraph service many years and is widely known as a competent and popular official.

IN SEATTLE the company has opened a branch telegraph office on the twenty-first floor of the 42-story L. C. Smith building. This is said to be a record for "high-up" telegraph offices. The office serves the telegraph needs of 2,500 tenants of the building.

C. A. PINSON, has been appointed chief operator at Terre Haute, Ind., vice H. L. Voight, transferred, effective October 21.

### Western Union Lake Division.

A Western Union Post of the American Legion is being organized in Chicago. In the various departments of the service there are 500 men eligible for membership in the Legion.

F. A. MOHNS, formerly manager at Janesville, Wis., has accepted a position with the Samson Traction Company. Mr. Mohns will be head of the company's telegraph department.

G. C. MATTES has been appointed manager of the office at Janesville, Wis., succeeding F. A. Mohns. Mr. Mattes has been manager of the office at Camp Grant, Ills.

J. W. FAWLEY, manager at Plymouth, Wis., spent a day in Chicago, recently. Mr. Fawley was on his wedding trip, having married a former Western Union telegrapher.

MISS CORRENE MOHLER, manager of the office at Effingham, Ills., has become Mrs. Vincent. Accompanied by her husband she spent a few days in Chicago, recently, and visited the main operating room.

SUPERINTENDENT A. R. MCGRATH'S office staff were much concerned recently over the temporary absence of J. J. McMahon, one of their number. Later they were elated when Mr. McMahon reported that he is now the father of a future telegraph superintendent.

C. O. KUHNS, the popular District Commercial Manager, having charge of southern Illinois territory, has returned to his office after a wedding trip spent at points in the eastern states. Mrs. Kuhns was formerly an employee of the Western Union Telegraph Company.

MISS VERNA FITCH, manager of the office at Pana, Ills., died on October 31, after undergoing an operation for appendicitis. Miss Fitch was popular with the business interests in Pana, and by the company was regarded as a competent manager. She was formerly an employee of the Indianapolis office.

R. H. UNDERWOOD, formerly manager at Evansville, Ind., has been transferred to Indianapolis, as district commercial manager.

W. M. FRYER, manager at Hammond, Ind., has been transferred to Evansville, Ind., as manager.

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F. L. BLOOMHUFF, relief manager, has been appointed manager at Hammond, Ind.

J. R. CLARK, relief manager, has been transferred to Greensburg, Ind., as manager.

H. C. GREEN, manager at Greensburg, Ind., has been transferred to Newcastle, Ind., as manager.

A. S. RIDGWAY, manager at Newcastle, Ind., has been transferred to Vincennes, Ind., as manager.

C. H. SLY has been appointed manager of a new office opened at Tell City, Ind.

H. C. GOODRICH, has been appointed manager at Bedford, Ohio, vice L. N. Taylor, resigned.

C. A. KUMNICK, has been appointed manager of the new Class 1 office recently opened at Van Wert, Ohio.

J. J. MALLEY, who recently returned to his duties as manager of the Portage Hotel branch, Akron, Ohio, again has been compelled by illness to return to his home in Defiance, Ohio, for further medical treatment.

R. H. SCOTT, has been appointed chief operator at Springfield, Ohio, vice L. H. Abbott, resigned to take service with a brokerage company.

ANNA PETRAT, night automatic supervisor of the Detroit, Mich., office resigned from the service and was married on November 25 to Edward Russell.

W. J. SULLIVAN, Morse supervisor of the Detroit office, has the sympathy of his friends and acquaintances in the loss of his mother, who died on November 8.

### Pacific Division Western Union.

J. E. RILEY has been appointed district commercial manager of the third district, Pacific Division, and assigned to California territory south and east of Los Angeles, including the Imperial valley. Mr. Riley formerly was district commercial manager in the Central Division, with headquarters at Kansas City, Mo.

J. Y BYERS of the office of Vice-President Willever, New York, visited the offices in Los Angeles, San Francisco, Portland, Seattle, and other Pacific coast cities during the past month in connection with office methods and systems. Mr. Byers, who formerly was an employee of the Los Angeles office, met many friends while there.

A. C. KAUFMAN, general commercial agent, has returned to New York after an extended trip to offices in the Pacific Division in company of General Manager M. T. Cook and Division Commercial Manager Newsom. During the trip new telegraph development and sales ideas were explained and illustrated at meetings of commercial department employees at Seattle, Portland, San Francisco and Los Angeles.

M. T. COOK, general manager of the Pacific Division, with Messrs. C. R. Fisher, division traffic superintendent, C. A. Rhodes, division auditor, and C. F. Newsom, division commercial manager, spent three weeks recently visiting important offices in the division.

EXTENSIVE TRUNK WIRE CONSTRUCTION WORK is being commenced in several directions to provide additional facilities required by the steady growth of business on the Pacific coast.

R. B. CALKINS is assistant chief clerk in the office of General Manager M. T. Cook, San Francisco.

FOR MANY YEARS the telegraph circuits between San Francisco and Portland have been repeatered at Ashland, Oregon, where the Western Union maintained an important station. The repeater sections have now been reduced in length by about 150 miles each and the efficiency of the service greatly increased by the establishment of two intermediate stations instead of one. They are located at Grants Pass, Ore. and Redding, Calif.

### New Repeater and Test Office Opened at Redding, California.

The Western Union Telegraph Company opened a new repeater and test office at Redding, California, on September 15 and on the same date the repeater office at Ashland, Oregon, was discontinued. Manager and Chief Operator W. E. Newcombe was transferred to Redding; night wire chief J. M. Hindman, and late night wire chief P. S. Moriarty accompanying him. The following comprise the present force at Redding: Walter E. Newcombe, manager and chief operator, Jas. M. Hindman, night wire chief; P. S. Moriarty, late night wire chief; Chas. W. Smith, repeater attendant; operators—F. L. Hohensinner, W. L. Higgins, W. R. Manning and C. H. Hanson. Messengers, Leo Taylor and Jos. Hart. Equipment of the very latest type has been installed at Redding and the office now becomes one of the important units in the overland service of the Western Union system.

### Western Union Gulf Division.

F. H. WEIDMAN has been appointed chief operator of the office at Marshall, Tex., effective November 16, vice L. J. Farmer, transferred to Dallas.

ROY DOBBINS has been appointed chief operator at Brownsville, Tex., effective November 16. He was formerly chief operator at Oklahoma City.

W. T. GERMANY has been appointed chief operator at Oklahoma City.

### Punishment for Transfer Fraud.

Eugene B. Nolan, who, by imposture, perpetrated a fraud in the sum of $125.00, upon the Western Union Telegraph Company, has been sentenced to an indeterminate term in the San Quentin, California, penitentiary.

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### New York Western Union.

J. W. McMAHON, of the testing and regulating department of the New Orleans, La., office has been transferred to New York and is employed in the testing and regulating department at 24 Walker St.

W. L. GEHR, of this office, died on November 4.

THE MOTHER OF William P. Carroll, operator in this office, died on November 19. Mr. Carroll's associates extend their sincere sympathy.

### New York Telegraphers' Aid Society's Annual Entertainment.

The New York Telegraphers Aid Society held its 39th annual entertainment and ball at Central Opera House, Armistice day, November 11, with a record attendance notwithstanding inclemency of the weather.

The object of this entertainment is too well known to the telegraph fraternity to need comment

Among the guests were, Newcomb Carlton, president of the Western Union Telegraph Company, W. N. Fashbaugh, vice-president; L. Mc Kissick, J. P. Edwards, S. B. Haig, Geo. E. Palmer, John Palmer; M. Hayden, Mr. Simmonds, Mr. Hyland, J. F. McGuire, M. W. Rayens and R. C. Mc Donald.

Delegations from Boston, Philadelphia and the Edison Company's laboratory, Orange, N. J., were in attendance.

An excellent vaudeville entertainment of five numbers was furnished by the B. F. Keith management.

After the performance the grand march was led by G. C. Gute, accompanied by Mrs. G. E. Palmer.

Great credit is due to Robert J. Marrin, chairman, and Mr. Thos. F. Clark, vice-chairman, for the excellent arrangement of the affair.

The following are officers of the society: Arthur M. Lewis, president; Edward F. Howell, vice-president; Thos. M. Brennan, treasurer; C. A. Kilfoyle, corresponding secretary; Miss M. E. Saunders, recording secretary.

THE ASSOCIATION OF WESTERN UNION EMPLOYEES, Brooklyn, N. Y., Local No. 131, held a dance at The Imperial, on the evening of November 28. The entertainment included a one-step contest, cabaret, jazz band, and all things that go to make up a sociable time. The large ball-room was well filled with telegraph merrymakers.

E. D. SLINGERLAND, well known telegrapher and wire chief, recently employed in offices in the Northwestern States, and at one time in government service in the Philippines, has been transferred from Minot, N. D., to Buffalo, N. Y., in the service of the Western Union Telegraph Company.

JOSEPH M. HAMMERLY, assistant wire chief at Charlotte, N. C., was a New York visitor on November 15, and called upon officials at headquarters.

## POSTAL TELEGRAPH-CABLE COMPANY

EDWARD REYNOLDS, vice-president and general manager, is again at his desk after a ten days' trip through the west. He advises that at Chicago, Minneapolis, Detroit, Duluth, and other points visited he found the increase in traffic measuring up to expectations and fully justifying the enlargement of facilities now under way.

E. P. TULLY, assistant to the general manager, is visiting offices in the west.

THE PLANT DEPARTMENT announces that it is now stringing wires at a rate in excess of one thousand miles per week.

ANOTHER LINK in the company's long distance telephone service was completed recently when the San Francisco-Los Angeles circuit was opened for public business.

UNDER THE DIRECTION of Division Electric Engineer O'Donohue, new offices have been fitted up at New Brunswick, N. J., and Suffern, N. Y.

JOHN H. MAYER, of the New York City plant department, has been promoted to a position in the office of Division Electrical Engineer J. P. O'Donohue. During the past ten years Mr. Mayer, as inside wiring foreman, had charge of a large number of telegraph installations in New York City.

THE COMPANY'S four new copper circuits between New York and Chicago operated Morse duplex, are working splendidly. These wires were erected and placed in service just in time to take care of the large increase in business which followed the return of the wires from government control.

MANAGERS APPOINTED: G. F. Lord, Pottsville, Pa.; H. R. Brown, Port Arthur, Texas; V. Fisher, Ypsilanti, Mich.; H. J. W. Wolfe, Uniontown, Pa., Pearl Meggison, stock yards branch, Sioux City, Ia.; H. P. Hirsekorn, assistant manager, St. Louis, Mo.; J. L. Daniel, Little Rock, Ark., and E. Cecil, Greenville, Tex.

### New York Postal.

IN THE MAIN OFFICE Dan Cupid has been busy. Nick Spinosa, Southern traffic chief, and James Russo, of the Washington bonus wire, having recently joined the ranks of the benedicts.

MISS IDA HOROWITZ, bonus operator on the first Baltimore circuit, has returned from her vacation spent in Richmond, Va.

THE FOLLOWING SERVICE CLERKS have graduated as operators and have been assigned to wires: Paul Coscia and H. Ross.

THOMAS GRAY of the service department has returned after an illness of a month.

RAYMOND TAYLOR, who was stationed in Panama during the war has been mustered out of the service and is now working extra at night.

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THERE HAVE BEEN SEVERAL CHANGES in management at New York City hotel branch offices. The new appointees are:

Miss E. M. Huner, at the Biltmore; Miss Riole, at the Ritz Carlton; Miss O. Bloss, at the Pennsylvania; Mrs. May, at the Belmont,

MANAGER W. B. SCHREIBER, reports that the FQ Office, 45th Street, New York, staff showed 100 per cent. enrollment in the recent Red Cross drive for membership—this included the messenger force.

ETHEL MARTENS, formerly employed as operator in the Postal office in the Hotel Biltmore, New York, has accepted a position as telegrapher in the National Bank of Commerce.

## Birmingham, Ala., Postal.

W. C. MCCAIN, general traffic chief, has returned from his annual vacation. Mr. McCain has been in the service of the company during the past twenty years.

B. S. MCCLANE, for several months manager at Columbia, Tenn., has been promoted to the position of manager at Decatur, Alabama.

EARL HAMMEL, manager at Decatur, Ala., has been transferred to Greensville, Miss., as manager.

ANNIE MAI WOODS, employed as operator at Birmingham, has been appointed manager of the office at Columbia, Tenn.

## San Francisco, Calif., Postal Notes.

B. W. FIELDS, division electrical engineer, accompanied by H. C. Shaw, superintendent of the first district, Pacific Division, recently completed an inspection trip to Stockton, Fresno and Bakersfield.

W R. ABLES, manager of the No. 26 California Street office, San Francisco, is moving the heaviest message traffic of any branch office in the city. The office is in the fruit and canning districts. The call of the office recently was changed from "SA" to "RN" in order to avoid confusion with the main office call "SF."

C. E. THIERCOF, formerly an employee of this company, is now in charge of the telegraph and cable department of Getz Brothers & Co., Inc., exporters and importers. During the war Mr. Thiercof was Censor No. 24 in the San Francisco censor's office.

RECENT CIRCUIT ASSIGNMENTS in this office are: F. Seaman, Seattle local, early nights; L. G. Le Compte, second Pacific; H. Bradbury, first Chicago; E. B. Smith, to Portland local; R. D. Thompson, first Chicago, days; W. A. McLerie, Portland local, days. Mr. McLerie spent the greater portion of the last two years in Europe, being located in the telegraph office in London until April last, at which time he was loaned by the Navy Department to the American Relief Administration to assist in distributing food suupplies in Austro-Hungary and Serbia. He was one of the few Americans at Fiume at the time the name of the largest hotel there was changed to "Orlando" from "Wilson." It is said that this action included a demonstration against the Americans.

JOSEPH CORCORAN, formerly a Postal operator in San Francisco, and who was with the Canadian army during the war, is now radio operator on one of the United States Army transports sailing in the Pacific.

## Milk Bottle Crash Startles Japs.

Officials of the Japanese Consulate in the Postal Telegraph Building, Market and Battery Streets, San Francisco, were startled November 13 by a crash of window glass. They rushed out and called the police, declaring that a bullet had been fired into the Consulate offices.

Detective George Hippeley rushed to the scene. He reported back to headquarters that the break was caused by a milk bottle that had fallen from the operators' room on the tenth floor, through a skylight, striking the window on the second floor and landing in a light well bottom where it was found unbroken.

Evan B. Diffendal, a tenant in the building, said he saw the bottle fall. Consul General T. Ota's secretary, sitting in one of the consulate offices, insisted a bullet had caused the smash.

TELEGRAPH SUPERINTENDENTS contribute to the well-being of their subordinates and to the efficiency of their telegraphs and telephones by recommending that all telegraph and telephone employees read TELEGRAPH AND TELEPHONE AGE. It costs this journal a large amount of money to publish the technical information and news items sent out twice each month at a cost to the reader of but two dollars per year.

## Western Union Revenue.

The company's report for August, this year, shows a total operating revenue of $8,985,890, an increase of $1,582,829 compared with August, 1918, and net operating income of $1,768,358, an increase of $869,805. Total operating revenue for the first eight months of this year was $65,491,225, an increase of $9,263,366 over the corresponding period last year, and the net operating revenue was $13,012,003, an increase of $3,404,986.

THE OLD WIRE CHIEF says: "Instinctively I rebel when I detect that either friend or foe is practicing psychology on me."

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## United States Cycle Tires are Good Tires

HEAVY SERVICE TRACTION TREAD

HERE is a sturdy tire that the 'hustlers' on your force will appreciate — a tire that means relief from puncture and valve trouble, made of the finest rubber and two plies of heavy motorcycle fabric to give added strength.

Just the tire to recommend when the boys ask about equipment that offers extra long mileage, plus non-skid protection.

**United States Tire Company**


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## THE CABLE.

### Cable Staff Changes

EASTERN TELEGRAPH COMPANY: Charles A. Maynard has been appointed superintendent at Malta, Charles A. Paine, superintendent at Carcavellos, and William E. Ricketts assistant superintendent at Malta.

PACIFIC CABLE BOARD: R. K. Hosking, to Fanning Island; G. E. Forrest, to Norfolk Island; R. W. Culpan, to Bamfield; M. S. Henry, to Halifax; C. L. Hertslet, to Auckland; and G. E. Muhldorff, to Suva.

WESTERN TELEGRAPH COMPANY: A. C. Earwaker, C. L. Stansell, and M. Murphy, to Buenos Aires; J. Sutton, S. U. Croker, C. B. Browne, V. Vann and L. E. Brown, to St. Vincent; G. R. Kirkby, J. A. Murray, W. A. Tulk, E. A. Scrase, A. C. Parry and S. J. Vidler, to Madeira; C. L. Hore, A. L. Stanbury and H. T. G. Anderson, to Pernambuco; L. J. Pratt, to Rio de Janeiro; A. J. C. Phillip and B. B. Browne, to Montevideo.

M. E. DEMALVILAN, of the French Cable Company's staff, and who has been on duty at the stations in Haiti and in New York for some years, has gone to Paris, France, where he will take up duties in the company's service.

S. F. AUSTIN, of the Commercial Cable Company, has gone to Cuba on company business.

### Additional Pacific Cable.

Extension of American cables as an aid to the development of the nation's foreign commerce was urged before the Senate commerce committee, November 15, by Maj. Gen. G. O. Squier, chief signal officer of the army. The committee is considering a bill providing for a new cable across the Pacific.

Gen. G. O. Squier recommended the laying of this cable along the coast of Alaska and thence to Asia. This route, he said, would reduce costruction costs. He said the present Alaskan cable, operated by the signal corps, was self-supporting, while its rates were proportionately lower than those on other deep-sea-cables.

### Cable Codes.

TELEGRAPH AND TELEPHONE AGE is headquarters for all cable cipher codes. Telegraph managers would do well to bear this fact in mind when customers make inquiries regarding such codes. We are prepared to furnish full information on the subject, our knowledge being based on over thirty-five years' experience in handling the hundreds of codes on the market. Address TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

## RADIO TELEGRAPHY.

### Marconi Notes.

AT A SPECIAL MEETING of the Marconi Company of America held November 20, the stockholders voted in favor of the absorption of the company by the Radio Corporation of America. The General Electric Company, which is backing the Radio Corporation in the venture, is to contribute $2,500,000, part of which will be used to acquire the American Marconi shares held by the British Marconi Company. These shares will form part of the capital of the Radio Corporation. The new company is to have a capital of 5,000,000 shares of 7 per cent preferred stock, $5.00 par, and 5,000,000 shares of common stock, no par value. American Marconi stockholders are to have the privilege of exchanging their holdings par for par for the Radio preferred stock and in addition are to receive an equal amount of common shares of the Radio Corporation for those of the Marconi shares now held.

THE MARRIAGE OF CARL H. TAYLOR, engineer, to Miss Mabel Steele, daughter of Mrs. William H. Tubman of Boston, took place in that city, November 22.

LYNN C. EVERETT, engineer, was married November 19 at Newark, N. J., to Miss Helen Kate, daughter of Mr. and Mrs. William Q. James.

CHARLES J. ROSS, comptroller, spent Thanksgiving at his old home in Cleveland.

A BANQUET is to be given by the Institute of Radio Engineers, at the Fifth Avenue Restaurant, New York, on December 9. E. B. Pillsbury is chairman of the committee on arrangements.

HERBERT G. OGDEN, patent attorney, has resigned from Marconi service to become head of the legal department of the Ingersoll-Rand Company, No. 11 Broadway, New York.

SAIM SELIM, radio operator, has returned from a trip to South America, where he went in the service of the Independent Wireless Telegraph Company, and has been assigned to a ship which has sailed for a European port.

H. EDWARDS, at one time in the government telegraph service at Kingston, Jamaica, and who completed a course in the Marconi radio school, New York, has completed his first sea trip, and on November 22 sailed on a vessel destined to a European port.

THE CANADIAN MARCONI COMPANY is operating ten stations on the Pacific Coast.

UNDER A NEW AGREEMENT between the Canadian Marconi Company and its employees rates of pay now commence at $70.00 per month for first year

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employees and continue by annual increases of $10.-00 per month until $120.00 per month is reached. In addition a charge allowance of $15 per month is payable to officers in charge of coast stations, and $5.00 per month to operators in charge of ship stations carrying two operators. Forty dollars per month is allowed for provisions, fuel and lodging. Operators at coast stations will receive two weeks annual vacation with pay.

THE GOVERNMENT OF VENEZUELA, South America, has sent three radio telegraph operators to the United States to complete their radio studies, and to acquire knowledge of the most advanced radio systems. The names of the men are: Antonio E. Toro Key, J. R. Delgado and Louis Jimenez.

THE WIRELESS SPECIALTY APPARATUS COMPANY of Boston, Mass., of which George S. Davis is president, has issued a large booklet illustrating and describing the company's radio apparatus. The booklet also contains reproductions of photographs showing several radio stations operated by the United Fruit Company.

THE RADIO REVIEW, vol. 1 No. 1. published in London, is being distributed among prospective subscribers. The first number contains a paper by A. E. Blondel on "The Goniometric Functions Applicable to Directive Aerials," a paper by W. H. Eccles, on "An Investigation of the Internal Action of a Triode Valve," also reviews of various other important radio papers.

## Good Book on the Telephone.

"THE PRACTICAL TELEPHONE HANDBOOK AND GUIDE TO THE TELEPHONE EXCHANGE," by Joseph Poole, has been revised and brought up to date in a 1918 edition. This work contains 724 pages of detail information in regard to all phases of telephone operation. Particularly timely chapters are those describing trunk-line working; underground lines; line loading; multiplex telephony, and submarine telephone cables. The price of the book is $5.00.

## The Western Union Multiplex.

The Western Union multiplex system is completely described in a neat pamphlet published by TELEGRAPH AND TELEPHONE AGE. The description of the system has been revised and brought up to date and the work is fully illustrated with views of the different pieces of apparatus. It was gotten up primarily as an appendix to Jones' Pocket Edition of Diagrams and Complete Information for Telegraph Engineers and Students, but some copies have been bound separately for the use of those who wish to carry it apart from the parent book as a matter of convenience. The booklet is the same size as the Jones' book, and can therefore be easily carried in a coat pocket. It will be found very serviceable to those who are studying the multiplex. The price of the pamphlet is 35 cents per copy. Send orders to TELEGRAPH AND TELEPHONE AGE, J. B. Taltavall, publisher, 253 Broadway, New York.

## A New Book on Radio.

Ellery W. Stone, the well known radio engineer, connected with the United States Radio Station at San Diego, Calif., has written a book entitled "Elements of Radiotelegraphy."

The author has succeeded in producing a book which covers in a logical way a study of the elements, the theory and the practice of wireless telegraphy. There is just enough historical reference to enable the student to gain a proper persective of radio invention and development.

All practical systems of radio signaling are described and illustrated, including the Marconi, Telefunken, Fessenden, Kilbourne and Clark, Haller Cunningham, Multitone, and Poulsen. What Mathematics is employed is of the simplest and easily worked out.

The book is of particular value to commercial and railroad telegraph students who are not familiar with advanced mathematics, and who desire to learn the operation of radio transmitting and receiving sets.

The book is bound in limp cloth and contains 267 pages.

Price, $2.50 per copy. From TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

VACUUM TUBES IN WIRELESS COMMUNICATION. By E. E. Bucher. Pages (6x9 inches) 174; illustrated. New York, August, 1918.

Mr. Bucher, who is instructing engineer, Marconi Wireless Telegraph Company of America, in the present work presents a volume which shows over one hundred different circuits for the practical use of vacuum tubes as detectors, radio or audio frequency amplifiers, regenerative receivers, beat receivers and generators of radio frequency currents.

A series of graphic charts in the appendix explains the functioning of the vacuum tube in an elementary manner. The technical introduction reviews the problems of continuous and discontinuous wave transmitters and receivers.

The book is ably written and the illustrations are clear and understandable. Telegraph students and engineers will find written in its pages a great amount of radio information along lines that are certain to be of importance in the operation of radio systems of the present as well as the future.

The price of this book is $1.75 and copies may be obtained by making remittances payable to John B. Taltavall, publisher, TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

## Books on Wireless.

TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York, is headquarters for all books on wireless telegraphy. Those desiring such books should send for our price list. We make it our business to fill all orders the same day they are received.

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## TROUBLES OF "AUTOMATIC" CHIEFS IN OTHER LANDS.

Telegraphers Carstairs and Lee, of the Australian telegraph administration, recently lined up in blank verse some of the troubles which daily beset a telegraph automatic attendant in that country. Printer chiefs in American telegraph offices, after reading the following, will very likely sense a feeling of comradeship with workers in foreign lands:

### An Average Auto Day.

Brother, just scan this simple lay,
Of a nice little average auto day.
You skip to work. Sign on at nine;
Ensconce yourself on scheduled line.
You "key" it for an hour or two,
When, lo, this gently trickles through.
"Show us reversals."—"Give us some dots."
"Stop!" "Stop!" he says, "A balance out."—
And then the fiend begins to spout.
The stations trim it one by one,
And when at last the task is done;
"Some more reversals, if you please."—
You do this to his rage appease,
When, "Stop."—"I cannot read you yet."—
"We're going on another set."—
"Now she's alright."—"Please let her go."
And with light heart you pray 'tis so;
Give them the juice, then—"Stop!" "Stop!" "Stop!"
You in disgust your bundle drop.
The Engineer now lobs along,
"How's she to-day?"—"Still going strong?"
"What?"—"Gets a bias did you say?"
Then for ten minutes he goes gay!
The T.O., now hops in with zest,
"Just half a mo,"—"I'll take a test."
Five minutes pass in speeding up,
His quota to your bitter cup!
Again you try to make a start,
When this comes through to break your heart;
"One moment please,"—"Mechanic here."
At this you shed some little fear
And ask him, "Why this slight defection?"—
"We're putting in another section."
How many times you curse your luck,
To hear him say, "My tape is struck."
Some entries in the log you make
To show that you are wide awake.
Up comes the Super. "What's up now?"
You see at once you've struck a row,
Try to explain, but he says, "How
"The—" "Can't you make her go "
You wish, by jove, you could do so.
Then out your lovely log you trot
To which His Majesty says, "Rot!"
"A solid hour has been spent
"And not a blooming message sent."
Shivers ice-cold run down your spine
As if you'd really burst the line;
He grabs the key and has a cut,
Into the pigeon-holes you butt
To straighten things a little bit,
And see that all the numbers fit.—
"Reversals." Once again rings out,
She's alright now without a doubt,
But—"Better try her up a notch "
This tastes to you like butter-scotch,
Dreaming. "Now things will be alright,
"We'll all be off on time to-night."
When—"Stop!" "Stop!" "Stop!"—Your dream is o'er,
And you 'reverse' again some more!
A relay at some station's gone;
You curse the day that you were born,
Imperilling your earthly end
By saying things you dare not send!
Thinking of wrongs that one might right
By free and frequent dynamite.—
Then softly comes a—"Try her, Joe."
And once again you let her go.
Next thing you hear,—"You silly clown.
"You have the tape in upside down."
"You have the tape in upside down."
At once you turn it right about
To find the center-line cut out!
With a repunch you start again,
This time. she's equal to the strain;
It works like some old thing inspired,
You give up thoughts of being fired,
Get off to time, crawl home to bed,
Dream of to-morrow's task with dread;
Arrive to find she's working well,
And think things that you dare not tell!
Two sides to this.—One never shown;
This is the good one on its own.
You know 'tis not a fabrication;
The other won't stand publication!

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### Experimental Wireless Stations.

EXPERIMENTAL WIRELESS STATIONS. By Philip E. Edelman, 272 pages; 98 illustrations.

This book is intended particularly for experimenters in wireless telegraphy as a guide to a rational study of the art. One of the main objects of the book is to provide a standard design for so-called amateur stations, to take the place of the many varieties of hit and miss apparatus constructed and purchased by experimenters.

The matter has been written with particular regard to clearness, simplicity and direct usefulness, and among the subjects covered are: Nature and theory of wireless transmission; aerials; grounds and lightning protection; general features of transmitters; resonance; calculation of wave length, capacity and circuit; transformers; spark coils; transmitting condensers; design and construction of spark gaps; detectors; solid rectifiers; tuning; interference prevention; right of the experimenter, etc. A supplement contains much matter of value, which brings the book up to date and explains the audion, time signals, balancing aerials, vacuum valves, amplifiers, etc.

Copies of this book may be purchased for $1.50 each from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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## A New Book.

Books which constitute a complete course in elementary electricity and cover in an understandable way all that the student needs to know in order to be qualified for engineering work, are not numerous. Most of the books now available which attempt to answer these requirements are in many respects out of date.

"Elementary Electricity and Magnetism," by Jackson and Black, is a book just off the press, and the authors have filled its 590 pages with theoretical and practical information of a thoroughly up-to-date character.

The book contains twenty-eight chapters with the following headings:

Batteries for Producing Electrical Currents, Electric Circuits and the Flow of Electricity. Ohm's Law, Electric Power and Heating Effects of Electric Currents, Electromagnetism, Nature and Properties of Magnetism, Electromagnetic Induction, Electrical Measuring Instruments, Electrical Measurements, Principles and Construction of Direct-Current Generators, Direct-Current Motors, Electrochemistry, Storage Battery, Principles of Alternating Currents, Inductance and Capacity in Alternating-Current Circuits, Alternating-Current Generators, Transformers, Alternating-Current, Motors, Power Stations and the Distribubtion of Power, Electric Lighting, Electric Heating, Electric Traction, The Telephone, Electromagnetic Waves. Radiotelegraphy and Radiotelephony, Roentgen Rays and Other Rays, Modern Theories About Electricity.

A copy of this book should be in the library of every telegraph, telephone and radio student. The price is $2.50 per copy. From TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

## New Western Union Telegraphic Code, Five-Letter Edition.

The New Western Union Telegraphic Code, Five-Letter Edition, has recently been placed on the market and the large sales of the book testify to its rapidly growing popularity. The business man needs this work, and when he sees it he instantly adopts it. The book contains 380,000 phrases, each phrase being represented by a five-letter word. These words are pronounceable singly or when two of them are joined together. The latter results in the saving of fifty per cent in cable tolls. The book weighs fifteen pounds, contains about 2,000 pages and measures thirteen inches in length by eleven inches wide, and is three and one-half inches thick. There is no waste space in the book. Every telegraph manager should call this book to the attention of his customers. The price is $30.00 per copy and it is on sale at the office of TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

## OBITUARY.

THOMAS P. CUMMINGS, fifty years of age, died in Phœnix, Ariz., on November 7. For many years Mr. Cummings was manager of the Jackson, Miss., and of the New Orleans, La., offices of the Western Union Telegraph Company. In later years he had been superintendent of the Louisiana District, retiring in 1916 on account of ill health. It was but a few weeks ago that he went with his family to Phœnix, and the news of his death has been received with deep regret by a host of friends and acquaintances in the telegraph service.

DR. ALFRED LOWTHER, at one time a telegrapher, and a frequent visitor at the gatherings of the Old-Timers, died in Detroit, Mich., November 10. Dr. Lowther about twelve years ago was a candidate for the Mayoralty of Detroit, on the dry ticket. For more than twenty years he had been a practicing dentist in that city.

## Telegraph and Telephone Supplies for Spain.

The Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C., has an inquiry (No. 31297) from a firm in Spain desiring to secure the representation of a manufacturer of telegraph and telephone apparatus and supplies. The firm guarantees deposit on consignments of models manufactured in the United States. Quotations should be given c. i. f. Spanish ports, or f. o. b., New York. Correspondence should be in Spanish.

## Electrical Measurements and Meter Testing.

This is a plainly written book, by D. P. Moreton. The book is particularly valuable to the telegraph and telephone engineers, because it deals directly with the subjects with which they are particularly interested. The voltmeter and the ammeter are the instruments used in this line of work, and these are to be found in all modern offices. Price, $1.00 per copy. For sale by TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York

## Book on Alternating Currents.

Arithmetic of Alternating Currents, is the name of a new book by E. H. Crapper. For those who are familiar with elementary mathematics, this book will be found valuable as it describes in a thorough manner periodic and alternating currents; generation of alternating electromotive forces; inductances; inductive circuits; capacity and condensers; resistance, inductance and capacity in parallel; static transformers; induction motors and transformation of currents.

The book contains 208 pages. Price $1.25. Copies may be purchased from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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# Telegraph and Telephone Age

TELEGRAPHY - TELEPHONY - RADIO

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ANY NEWSDEALER in the United States or Canada can obtain copies of Telegraph and Telephone Age through the American News Company, New York.
BACK NUMBERS of this journal three or more months old will be charged for at the rate of 25 cents per copy.

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### Success From Study.

It is often the case that men fail to achieve success because they regard success as accidental. Some grow old and lose their hearing, waiting for the tap-tap of opportunity.

The majority of men set out on the trail of success with the notion that it is elusive, and that it must be cornered, caught and hobbled in order to be possessed and applied to their personal advantage.

What a different story the biographies of successful men unfold!

In the bygone ages of Feudalism and Orientalism, men thought it majestic to do nothing; but, in the words of Emerson, "The modern majesty consists in knowledge and work."

There are those who despair of attaining success in their professions because they do not possess the "gift" of ability to speak well in public. Unquestionably, good stage presence and ability to speak convincingly in public are of material advantage in furthering a man's success; but unless a man possesses a sound knowledge of his business, ability to speak well may only lure him to the vaudeville stage.

An examination of the biographies of successful men discloses one outstanding common fact—that is, that they are in possession of a thorough knowledge of every detail of their business and of related activities.

And, knowledge and learning must be acquired by dint of personal effort and study.

"Learning by study must be won,
'Twas ne'er entailed from sire to son."

If a successful man is found to be not a fluent speaker, it is certain that when he does speak his words, although few, are freighted with logic—logic based on wide reading and study, and a thorough knowledge of the subject under consideration.

In the telegraph, telephone and railroad fields today, there is greater need than ever before for men who possess a wide knowledge of the economics of communication and transportation, and knowledge of this order may now be coined into personal success.

If men were courageous morally and intellectually, as they are physically courageous, a greater number of us would reach high and useful levels. For instance, if success would follow submission to physical suffering, there would be a line-up from Sandy Hook to the Seal Rocks, of men willing to sacrifice flesh or bone to establish their claims to preferment.

Aside from the very limited number of instances where men who are not qualified for advancement reach high positions, in the main there is but one royal road to success—the well-worn road traveled by those who have succeeded; that is, by reading and studying the best available literature covering or related to the subject of one's work.

### A Merry Christmas and a Happy New Year.

These are gladsome words. With varying contexts they are used at this season of the year by millions of people. Each Christmas they are voiced the world over by all who know language.

The Christmas season means much to humanity—more now than ever before. At this season there is about us some undefinable reality—call it of the spirit, if you wish—that acts to renew our faith in a desirable human destiny.

A universal wish of childhood is that Christmas might last all year. Our wish is that the readers of TELEGRAPH AND TELEPHONE AGE may be enabled to carry far into the new year the kindly, considerate, and brotherly spirit of Christmas.

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# INTERNATIONAL SUBMARINE AND RADIO COMMUNICATION AS RELATED TO AMERICAN COMMERCE

By John Jacob Rogers.

[Editor's Note: The following article was prepared by John Jacob Rogers, Representative in Congress, and Acting Chairman of the House Committee on Foreign Affairs. The article was first printed in the New York *Times* on November 23, 1919. Much has been said and written from time to time by political interests on the subject of international communication, most of which has been visionary to the degree of impracticability. Mr. Rogers' contribution to the subject indicates that he has given the matter thorough study, and that he has a good working knowledge of the entire question of international electric communication from the American commercial viewpoint.]

It is a remarkable fact that despite the enormous increase within recent years in the facilities for communication between nations and between individual citizens of different nations there has been relatively little advancement made in international agreements or understandings tending to make that communication stable, inexpensive and universal.

Until about a half century ago the only means of transmitting information across a national frontier was by letter or by personal journey. International arrangement for postal communication dates back only about thirty years. And the United States was the sponsor for the idea that international postal communication should be harmonized, and was thus directly responsible for the birth and effective growth of the International Postal Union.

The methods of international communication which depend upon electrical energy—the submarine cable, the telephone, the telegraph and the radio—are still in their infancy. No international arrangement covers the use of any of them except the submarine cable. While we have cable treaties with the other powers, dating from 1884, 1885, and 1886, these treaties are general and somewhat vague in language and have little or no practical value today. There are no international conventions of any value relating to telegraphy, telephony, or radio.

Although the United States is isolated from the other great powers by a wide expanse of ocean, so that adequate international communication probably means more to us than to any other great power, we have been characteristically backward in realizing the importance of increased international communication facilites and of a common agreement covering the use of and rights in these facilities. As in so many other cases, it has taken a world war to awaken us to the needs and the opportunities.

One recommendation of the Council of Five at Paris was that there should be held an international conference for the consideration of all questions relating to communication among the nations. The representatives of the United States were cordially in accord with the proposal and suggested that if the necessary congressional sanction could be obtained the United States would desire to invite delegates from the other powers to come to Washington in the near future for this purpose. The other principal powers accepted the suggestion and will promptly respond in case a formal invitation is extended. A bill to provide the congressional authority was passed by the House of Representatives on Oct. 22, and prompt action by the Senate is expected.

Some of the things with which this world conference will probably deal are considered in this article.

### CAPTURED GERMAN SUBMARINE CABLES.

At the outbreak of the war Germany was one of the great cable owners of the world. The effective control of the seas established by Great Britain early resulted in the elimination of Germany from the use of her own cables. One or two illustrations of what happened may be interesting. There was a cable from Emden, Germany, to the Azores, and thence to New York. Great Britain grappled for the New York end of the cable some 600 miles out to sea, cut it, and diverted it to Halifax. She cut the other end in the English Channel and diverted that to Land's End. Thus the cable suddenly became a British-Canadian cable instead of, as before, a German-American cable.

Another German-American cable was cut by France in the English Channel and the end diverted to Brest, thus giving France an additional cable to the United States. The United States protested vigorously at these proceedings, but owing to the lack of international law and agreement we were unable to obtain any redress. There was another German-owned cable running from Liberia to Brazil. This constituted the only direct means of communication between Africa and South America. Both termini were in Entente countries. Yet because the cable was German-owned, Great Britain cut it and put an end to communication by its means.

The disposition of the captured German cables was on May 2 last decided upon by a resolution adopted in Paris providing that Germany should renounce in her own behalf and in behalf of her nationals, in favor of the principal allied and associated powers, "all right, title, or privilege of whatever nature in the submarine cables set out below or any

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portion thereof." Appended was a list of the German cables such as those above mentioned. "And those in use shall continue to be worked in the condition at present existing." In other words, the German cables were to be continued in the hands of the principal allied Governments. But, the agreement continued, in reaching this formal conclusion the powers agreed that the ultimate disposition of the seized German cables should be determined at the international conference above mentioned.

This will be one of the most important tasks before that assembly.

### INTERNATIONAL CABLES IN GENERAL.

Great Britain is the great world owner of submarine cable. France possesses a few; we possess a few; and, as above stated, before the war Germany was also a considerable owner. The present supply of cables is far below the needs of the world. There is, for example, great need for more cables across the Pacific. There is only one cable now, and that is badly overloaded. There is need for a cable between the United States and Brazil. No direct cable now exists. A message from the United States to Brazil goes down the west coast of South America, across the continent to Buenos Aires, and thence to Brazil.

The single trans-Pacific cable runs from the American continent to Guam, whence one branch goes to the Philippines and Shanghai and the other to Japan. There is another cable from Vancouver to Australia. The British government plans to have a government owned cable connecting all portions of the empire. Up to this time the United States has shown little initiative in this respect. Not only is our supply of cables inadequate, but the rates charged upon some of the American cables are almost prohibitive. For example, there is a 1,200 mile cable from New York to Haiti and it costs 80c a word for a message. There is an 11,000 mile journey, mostly by cable, from New York to Sydney, Australia, and it costs only 66c a word. This Vancouver-Australia cable is run at low rates, with a definite purpose of linking up the British Empire. The British government's own rate from New York to Sydney via this cable is 16c a word. The best press rate from New York to Shanghai, a very much shorter distance, is 45c a word.

We have thus been backward in matters of communication just as we have been backward in shipping. Each deficiency means a loss in trade, for trade thrives on swift and abundant communication. One of the means of building up our international commerce is to build up our international communication.

### LONDON, THE WORLD'S CABLE CENTRE.

Let me give another instance. To reach the most of Europe a message from the United States is cabled to London, put on to another cable and forwarded from London to its destination. That means a delay in London, and an extra charge to the American business man. London is now the cable centre of the world. In war times practically every cable message we sent to the eastward was censored in London. Leaks are unavoidable and in fact frequently occur. There is a growing demand for direct cables from the United States to Scandinavia, to Germany, to Brazil, and to Spain and Portugal, with a loop running around to Italy.

So much for the commercial side of the present shortage in cables. There is also a great need for more cables in connection with new development and consequent national prestige. The United States viewpoint is not now being correctly interpreted—indeed it has never been correctly interpreted—in the other countries of the world. American news is often rewritten with hostile intent or expunged altogether. The reason is that we have no means of putting our news into most of the foreign newspapers. It has been found that we could go into any country in the world and with very little effort create a demand for American news. The entire world is interested in the United States and in what we are doing; but it has had no satisfactory means of finding out about us.

It has been proved that people in other countries will begin to read about the United States if they have the chance. And if they begin to read about us they begin to understand about us; and if they begin to understand us, they not only tend to like us better, but they begin to be more interested in buying our goods. So here again our success and prestige in the commercial field, as well as in the realm of world politics, depends very directly upon the amount of American news in the foreign press. If New York, Chicago and Boston quotations are appearing in the newspapers of a given foreign country, the work of an American salesman in that country is half done.

### AMERICA IN THE FOREIGN PRESS.

Perhaps it is worth while to stop and notice the primary reason for the lack of space given the United States in the foreign press. Before the war there were four great press associations: the Associated Press, American; Wolff, German; Havas, French; and Reuter, English. These four divided the world up among them and then exchanged news. Under this arrangement Havas had Latin America and the French possessions. Thus American news for Central and South America went from Paris and not from the United States at all. American news was selected by the Havas representative in New York and sent to Paris. There the Havas agent would select what portion should go to South America. The Wolff agency had Eastern, Central and Northern Europe, generally speaking the Slavic and Scandinavian countries. For forty years the Scandinavian countries had thus received their news from Berlin. When the war broke out the Allies were dumfounded at the unsympathetic attitude of Scandinavia. But this was the most natural thing and indeed almost inevitable. For forty years the Scandinavian view of the world had been obtained through the eyes of Berlin. The Wolff agency was largely used as a vehicle of pro-German propaganda, and was hostile to the United States.

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Similarly Reuter, the British agency, had had the British Empire, except Canada, and all of Asia. Thus the viewpoint of Asia was and is largely British.

Of course, the four great news agencies did not operate exclusively. Germany, for example, worked her propaganda in other ways as well. Sometimes she did this by establishing independent news agencies, as in the Orient and South America; sometimes she did it by independent propaganda. But we have taken advantage of none of these methods. The Associated Press supplied only the United States and its possessions, Canada, and Mexico. Nowhere else in the world was the American viewpoint presented. The United States has been asleep to its opportunities. In Japan, for instance, only a few words of American news finds its way into the press. That news is usually of the sensational type, none too creditable to the United States, or of anti-Japanese character. The result on Japanese public opinion is immediately apparent. At the time of the recent race riots in Chicago people in Japan generally thought that Chicago had been largely or wholly destroyed.

### CASE OF LATIN AMERICA.

We have made a beginning toward a better state of things in the case of Latin America. The problem was primarily one of getting American news to South America, which read nothing about us and heard little that was favorable to us. Lately the United Press has gone into a few places in South America. Still more important, since the first of the year the Associated Press has revised its contract with Havas, so that the news of the former may now go directly to Latin America. Since Jan. 1 of this year the Associated Press has been sending 3,000 words a day to over twenty papers in South America. The results of the first hand knowledge thus obtained of our country is already apparent. If a direct service could be established to China, destined to be a great newspaper reading country, the influence on Chinese thought toward America would promptly become manifest and most important.

Linking up what I have been saying, it can be seen that the basic reasons for the lack of American news in other countries are two: First, the lack of appreciation of the American Government and of its business men of the importance of having a fair picture of the United States placed in the foreign press, and, second, the wholly inadequate cable service connecting the United States with the other continents of the world.

Mr. Balfour, speaking for his government at Paris, said that Great Britain had no desire to monopolize the cables of the world, and realized that all must agree that the multiplication of cables was beneficial to civilization. Our Secretary of State strongly advocated the internationalization of the world's cables. That great question, with its infinite ramifications, will also be taken up at the forthcoming conference.

I have pointed out the shortage of cables. I have pointed out what happened to enemy cables during the war. There is a direct connection between these two facts. Capital does not flow readily into an enterprise which is uncertain or precarious. If a cable can be cut in war without possibilities of redress to the owner, capital looks askance at the investment. The world sorely needs—and perhaps the United States peculiarly needs—an international arrangement which shall secure and protect the rights of owners of cables both in peace and war. The resultant security will mean that abundant money will be available and the signs are numerous that a vast increase in cable building will promptly be forthcoming. To summarize this phase of the discussion, then, it is important for the true appreciation and understanding of the United States by her sister countries, and it is important for the healthy growth of the American foreign trade, that cables be multiplied. A condition precedent to this is cable security which is dependent upon international guarantees and perhaps on actual internationalization. These desiderata can be achieved only through the medium of such an international assembly as is now projected.

### INTERNATIONAL USE OF RADIO.

Much the same consideration may be adduced in connection with the international use of wireless or radio. We all know that the radio is still in its infancy. The question may arise as to whether the radio will not ultimately supersede the submarine cable. Without intending to be dogmatic, my impression is that it will not. The two will exist side by side. Each will find its niche, as have the telephone and telegraph. In one field one will be preferred and in another the other will be more practical. Secrecy, certainty, accuracy, and in some cases speed will be on the side of the cable. Economy will usually be on the side of the radio.

Nearly every country in the world is considering radio legislation. Many are going into the radio business. The radio is inherently international. It does not recognize international lines and will not stay within international boundaries.

### COMMUNICATIONS.

All who have acquainted themselves with the subject realize the necessity of universal traffic regulations and to international agreement as to wave lengths, et cetera. Then we have questions of communication with aircraft, of ship to ship communication, of ship to shore communication, and so on The sending of weather reports over the world by radio will probably be a development of the future Here again both American commerce and prestige require us to be in the forefront of the wise direction of radio development. This again can best be achieved through international exchange of views at a representative conference of the nations.

Questions relating to telephone and telegraph are perhaps not so peculiarly important to the United States as are those arising in connection with the radio and the cable. Indeed, the international aspects of the use of the telegraph and telephone are fewer,

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and to this country at least of less importance; but a standardization of the questions here presented will also be of great utility to the civilized world. I hope and believe that the conference will deal intelligently with these questions.

The conference itself will have no power to bind the nations to any course of action. It will probably, however, draw up an agreement which will later be presented to the several powers for acceptance. If it does not reach such an agreement it will have failed of the largest part of its usefulness. Its success will depend primarily upon the character of the delegates sent to it by the various participating countries.

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# AN ADDITIONAL PACIFIC CABLE

## GEORGE GRAY WARD, VICE-PRESIDENT AND GENERAL MANAGER OF THE COMMERCIAL CABLE COMPANY, EXPLAINS HIS COMPANY'S POSITION

George Gray Ward, vice-president and general manager of the Commercial Cable Company, was invited by Senator Wesley L. Jones, chairman of the Committee on Commerce of the United States Senate, to appear before the committee in connection with the pending bill for the construction of an additional Pacific cable. Owing to illness at the time, Mr. Ward was prevented from personally appearing before the Senate committee, but on November 18, he wrote Senator Jones a letter on the subject, in which he said:

"As you doubtless have seen in the public press, my company several months ago decided to lay another cable across the Pacific Ocean, and I have recently returned from Europe, where I personally looked into the possibilities of doing so at an early date. There are many important questions to be considered in connection with such a project—the route, the depths, the landing concessions, capital expenditure, etc., but I am confident that we can not only meet all the requirements of the government and the merchants of this country trading with the Far East, but can have a cable manufactured and laid as quickly, if not more so, as anyone else.

"Before going further into the details of these questions, perhaps it would be interesting to your committee if I mentioned the situation which led to the congestion of the present Pacific cable, and briefly describe some of the other facilities for cabling to the Far East, because I observe that in some of the testimony given before your committee statements were made which are not quite accurate.

"Before the beginning of the European war in 1914 there were five routes from America, to the Far East. Three of these were by way of the Atlantic where there are thirteen American-controlled cables. From Europe to the Far East there were the following:

"(1) One route operated by the Great Northern Telegraph Company, of Copenhagen, Denmark, consisting of cables and land lines between Europe and China and Japan by way of Russia and Siberia.

"(2) Another route operated by the Indo-European Telegraph Company, of London, England, consisting of cables and land wires between Europe and the Far East by way of Germany, Russia and Persia.

"(3) Another route operated by the Eastern Telegraph Company, of London, England, and associated companies, consisting of a chain of cables between Europe and the Far East by way of the Mediterranean, the Red Sea and Indian Ocean.

"The remaining two routes are as follows:

"(4) A route operated by the British Pacific Cable Board on behalf of the British Imperial Government, the Canadian Government, theAustralian Government and New Zealand, consisting of a cable line between the Island of Vancouver, Fanning Island, Fiji, Norfolk Island, and Australia with spur line from Norfolk to New Zealand. This cable line is owned jointly by those Governments, and used almost exclusively for the transmission of messages between Great Britain, Canada and Australasia.

"(5) The fifth route was and is that of the Commercial Pacific Cable Company between San Francisco, Honolulu, Midway Island, Guam (Ladrone Islands), Manila (Philippines) and Shanghai, China, with a spur from Guam to the Island of Bonin (belonging to Japan), and connecting there with a Japanese Government cable to Tokio. That is our cable system.

"Our cable was laid primarily to serve the United States on the one side and the Philippines, China and Japan on the other.

"Up to the beginning of the European war this cable was ample to meet all requirements both of the Government and of the commercial interests of the country. It was only used to about one-half of its capacity. No one, of course, foresaw what was coming in 1914, or could have foreseen what effect it would have on cable communication when it came.

"The immediate effect of the war on communications to the Far East was to close both the Great Northern Telegraph Company's route via Russia and Siberia (1 above), and the route of the Indo-European Telegraph Company, via Germany Russia and Persia (2 above), and these two channels to the Far East were closed during the war, and are still closed.

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"The cables of the Eastern Telegraph Company's system to the Far East, running from England through the Mediterranean (3 above), became interrupted from time to time, and owing to the danger of submarine attack repair work was done under the most hazardous and difficult conditions, and consequently that route became only a fragment of its original form, and what was left of it was so filled with the official business of the British Government that it was seriously handicapped in the handling of commercial messages. The consequence was that the Commercial Pacific cable (5 above) became overloaded with traffic which it was never designed to be the normal route for. Traffic which used to flow from America to Asia via Europe, and even from Europe to Asia via the European routes, was diverted to the Pacific cable route, so that the congestion was not so much the increase in the traffic which the Pacific cable was intended to serve, as it was to the flow to the Pacific cable of traffic that was never expected there. This situation was further aggravated when the United States entered the war and the Government messages increased heavily.

"The British Pacific cable between Vancouver and Australia (4 above) was also heavily congested in consequence of the interruptions and congestion of the European routes, which forced almost all of the traffic between England and Australia on to the British Pacific cable. This cable, so far as it was capable of doing so, assisted in transmitting traffic to and from other places in the Far East, but this assistance was of necessity negligible.

"Briefly, these are the reasons for the heavy delay on the Pacific cable, and it will be seen that it was due to conditions which could not be controlled or remedied.

"Perhaps I should here mention that a committee of technical experts, appointed by the State Department to report upon the operations of cables during the war, recommended the application of certain apparatus for increasing the speed on cables, invented by Mr. E. S. Heurtley, of London, England. We were well acquainted with the Heurtley apparatus, because the Commercial Cable Company was one of the first companies to adopt it on the Atlantic cables, but neither the apparatus nor the services of the inventor were obtainable during the war. Furthermore, the application of this apparatus means long periods of experimental work, during which the existing apparatus requires considerable readjustment, and the cable cannot be used for the transmission of traffic during such periods. You will therefore understand that, even if we could have secured the desired apparatus and the services of the inventor, we should have had much hesitation to stop the continuity of our service to carry on installation work which may have extended over a period of months. We did, however, introduce a system invented by Mr. William M. Bruce, Jr., of Springfield, Ohio, which materially enhanced the output of the cable during the war, and we are now supplementing this with the first Heurtley apparatus it has been possible to get.

"It has been the policy of my company and its associated companies to anticipate the growth and development of the trade between the United States and foreign countries rather than wait until that trade has actually demanded greater communication facilities, and I trust the foregoing explanation will convince you of the impossibiltiy of anticipating and making provisions for such an abnormal situation as that with which we were confronted.

"Now, as to laying another Pacific cable. As stated above our present cable line runs from San Francisco to Honolulu, Midway, Guam, Manila, and Shanghai, China, with a spur line from Guam to Japan. That cable line is more than ample to provide rapid service with the Philippines and China, if it could be relieved of the larger volume of traffic with Japan. The route along the line of the present cable has been carefully surveyed—and this is valuable information. A second cable from San Francisco to Honolulu and Midway would merely be supplemental and not initial, which would be an important factor in annual station expenses as well as office installation. San Francisco is the largest land telegraph terminus on the Western Coast, with direct land-wire facilities to important centers in the United States, which gives it a great advantage over any other landing point in serving public demands. When we laid our present cable in 1902, the Postal Telegraph Company, our land-line system in the United States, strung a special copper wire from San Francisco to New York exclusively for the rapid transmission of Pacific cable traffic. This wire has since been supplemented by additional land-line facilities between the East and the West, terminating at San Francisco. Therefore, taking all these very important facts into consideration, we intend to lay our new cable from San Francisco to Honolulu and thence to Midway, thus duplicating our present cables as far as that point, and from Midway we have in mind laying a cable direct to Tokio, Japan, or by way of Guam. Such a cable would provide an excellent and rapid service with Japan, which would be an advantage to the large number of American merchants trading with that country. This will allow the present cable to be used entirely for Philippines and China traffic, for which it will be more than ample.

"I believe it was intimated to your committee in testimony on September 22 last that we have done nothing about the laying of a second cable. I beg to assure you that this is not the case. We are in negotiation with Japan at the present time on the question of landing rights. When we laid our present cable in 1906 we desired to extend it to the mainland of Japan direct, instead of landing it at Bonin, but the Japanese Government preferred to have us stop at Bonin and lay a cable themselves from Tokio to Bonin to meet us. We believe that if we could secure the right to land the new cable in Japan and operate it ourselves with our own staff and under our own supervision, we could improve

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the quality of service obtained under present conditions. Or instead of laying a cable from Midway to Japan direct we could duplicate the line from San Francisco to Guam and thence to Japan by way of Bonin, and another cable line from San Francisco to Guam and thence to Manila and China.

"Prior to the war there was a cable in operation between Guam and Yap; at Yap it connected with two cables, one going south to the Dutch East Indies and the other north to Shanghai. These cables were owned by a German Dutch Company, the Deutsch Niederlandische Telegraphengesellschaft of Cologne, Germany. The cables between Guam, Yap and Shanghai formed a valuable alternative route during interruptions of our cables between Guam and Shanghai. The Guam end of the Yap cable was operated by us in our station at Guam, and we could resume doing so if the route were reopened for traffic. We understand that these cables form part of considerations to be dealt with under the Peace Treaty, and as they would be a valuable adjunct to our cable system, we have offered to acquire them, if possible, at a fair valuation.

"There has been some discussion of a cable route via the Aleutian Islands, Alaska, and this proposal has received some favorable mention from the Department of Commerce and others. The best judgment of expert cable engineers is that the Northern route is unfavorable, both because of climatic and actual operating conditions. The ocean bed over that route is bad. The tides around the islands are rapid and uncertain, and the islands themselves are volcanic. The shocks of earthquake and volcanic phenomena are of frequent occurrence and disastrous to cable working. The whole region is fog bound for months in the year, and as a consequence repairs in the cables during certain portions of the year and at long stretches at a time would be impossible. The numerous relays which would be necessary would slow down the speed of the cable and be productive of errors. Over our proposed cables we would work direct from San Francisco to Tokio with only automatic relays at Honolulu and Midway. As a route for cables the northern route has everything to discredit it in natural and physical properties. Its only recommendation is that it would cost less, and we think that would be poor economy. The route which we propose to take has been tried to Midway by our present Pacific cable, which has been laid for sixteen years, and in all that time there have only been four interruptions in the cable between Guam, Midway and San Francisco. The greater number of interruptions have been west of Guam, namely, between Guam and Shanghai, principally in the San Bernardino Straits, and this condition we are now remedying by diverting the cable away from those dangerous straits, although that improvement is at present held up by delays of the Philippine Government in granting a permit to use the highway across Luzon. There can be no question as to the choice of routes. The Northern route would be an absolute failure in so far as maintaining economical direct and prompt cable service between the Far East and the United States is concerned.

"Our company has the experience, the equipment and the staff, and is best fitted to operate any extension of the cable service in the Pacific Ocean. The Government could not give the same class of service as our company. When the laying of a Pacific cable was first discussed in 1900, it was proposed that the Government should either lay a cable of its own or subsidize private enterprise. Our company offered to lay and operate a cable without any subsidy, and after much debate in Congress the latter refused to sanction either a Government cable or a Government subsidy, and our company laid the cable. Before the Commercial Pacific Cable was laid the rate from San Francisco to Japan was $1.88 a word, whereas it is now only 96 cents a word, it having been reduced by various steps to this. Similarly the rate to China was $1.72 a word, and it is now only 88 cents a word. The rate to the Philippines was $2.47 a word, and it is now only 80 cents a word. For many years the traffic was very small. We were the pioneers in the work; we have our own cable repairing steamer. We now propose extending the cable facilities in the Pacific. There is therefore no need for the Government embarking on any venture of this kind, involving as it would the expenditure of a large amount of money and the likelihood of loss in operation and the certainty of dissatisfaction to the public.

"We believe the Government control of the telegraphs during the past year, carrying with it increased rates and inferior service, has demonstrated the superiority of operation by private companies, and I am certain the American public do not desire Government control or operation of communications."


### "The Night Operator."

Telegraphers who enjoyed reading "The Wire Devils" will welcome this new book by Frank L. Packard. The book contains a number of short stories written about the alluring game of railroading; the first story, "The Night Operator", is also the title of the book.

In "The Night Operator" you will follow with spell-bound interest a panorama of rushing mountain rivers and dangerous curves, of brave men responsible for the safety of others, who meet their obligation with high hearts and abounding courage.

And when the book is read you will recall with delight "Toodles," the spunky little night operator, "Royal Carlton," the big superintendent, "Regan," the purposeful master mechanic, and "Timmy O'Toole," the valorous Irishman, and say to yourself, "Packard has done it again; written another breathless adventure story; I hope he goes on writing them."

The price of the book is $1.50 net. For sale by TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.


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# THE MORKRUM PRINTING TELEGRAPH SYSTEM

## FULL DESCRIPTION OF OPERATION

(*Continued from December* 1 *issue.*)

### PRINTER.

The Morkrum printer is a typewheel printer, that is, the letters of the alphabet are arranged around the rim of a wheel. By rotating this wheel varying distances either to the right or left of its normal position any of the letters can be brought to the printing position. A striking mechanism throws the typewheel forward against the platen and the positioned letter is printed. A universal joint in the shaft carrying the typewheel permts of this action with the typewheel rotated to any position.

Mounted directly in front of the typewheel on a movable arm is an inkwheel or roller. As the typewheel starts toward the platen, it strikes the ink roller which rolls across the face of the type thus inking it. As the typewheel continues to move toward the platen, the inkwheel is thrown upward out of the way.

operation of the shift mechanism will be explained later.

The typewheel is held on the spindle by a spring clip passing through a slot in the upper part of the brass bushing of the typewheel, and entering a groove in the spindle.

To locate definitely the position of the typewheel, a locating arm is fastened to the hollow shaft and passes through a square hole in the typewheel, thus causing it to rotate with the shaft.

The typewheel and its operating mechanism are supported on a moving carriage. At the front of this carriage are two bearings through which the carriage shaft passes. The back of the carriage is supported by a grooved wheel traveling on a round guide rail. The carriage thus has a three point support. A hole H, allows the shaft which operates the striking mechanism to pass through the carriage.

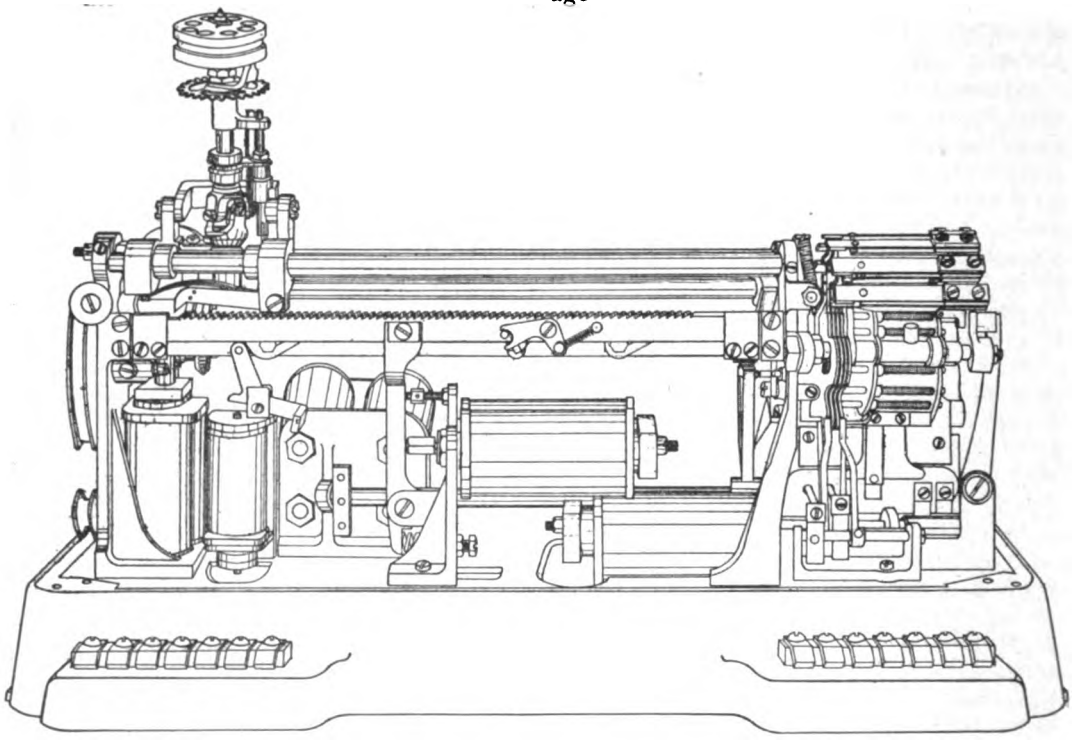

FIGURE 22. PRINTER WITH TOP AND COVERS REMOVED.

The top part of the typewheel shaft is hollow and contains a spindle to which the typewheel is fastened. This spindle is held in place by a collar and screw, and by means of a mechanism meshed with this collar, the spindle, and thus the typewheel, can be shifted upward bringing into printing position a second row of characters on the typewheel. These characters are figures and punctuation marks. The

*Rotating Mechanism.*—Fixed to the lower end of the typewheel shaft is a horizontal bevel gear, which meshes with another bevel gear arranged to slide on a square shaft. The rotation of this shaft revolves both gears and thus the typewheel.

On the right end of this square shaft is a pinion. Meshing with this pinion is a gear segment, pinned to another shaft known as the rotator shaft.

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The left end of the rotator shaft is fastened to the center of a cross bar known as the rotator shaft lever. The plungers of the two rotator solenoids, one above the other below the shaft, press against the ends of this lever. As only one of these solenoids can be actuated at a time, the pressure of its plunger rotates the shaft either clockwise or counterclockwise, causing the gear segment to move for-

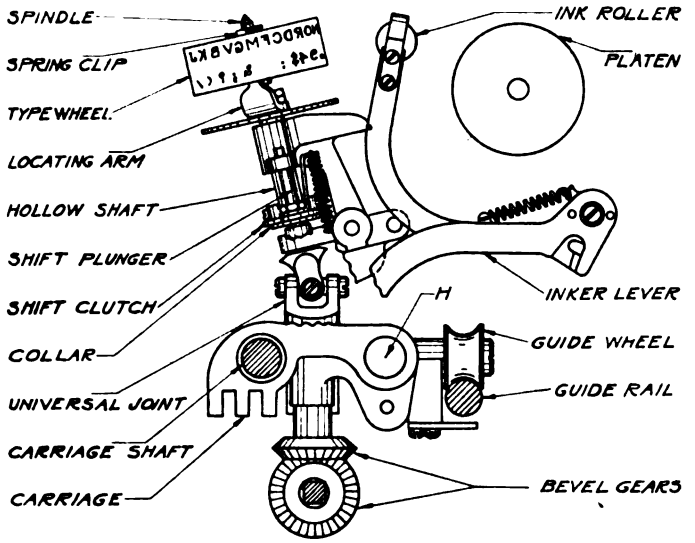


FIGURE 23. TYPEWHEEL MECHANISM

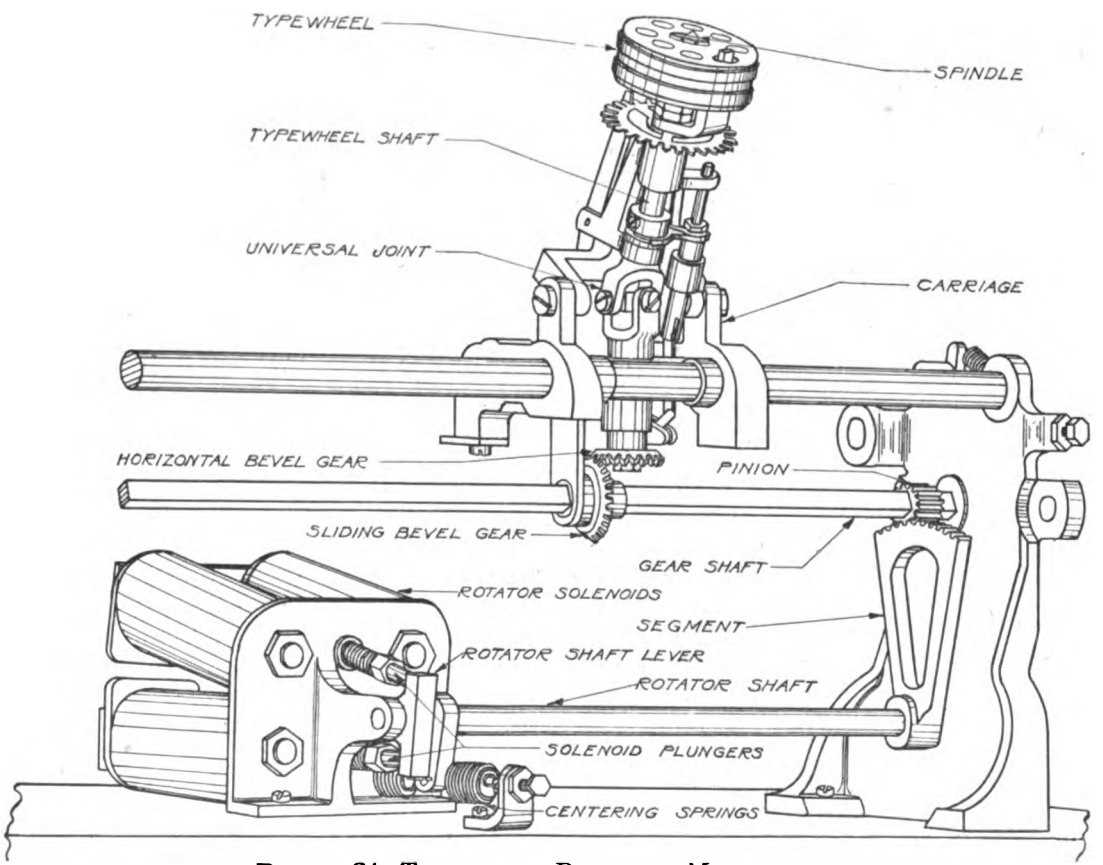


FIGURE 24. TYPEWHEEL ROTATING MECHANISM.

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ward or back. This segment meshing with the pinion of the gear shaft controls the typewheel rotation. Thus the operation of one rotator solenoid will rotate the typewheel to the right and the operation of the other will rotate it to the left.

In order to bring any particular letter or character on the typewheel into the printing position, a means must be provided for arresting the rotation at the proper places. This is done by the selecting mechanism.

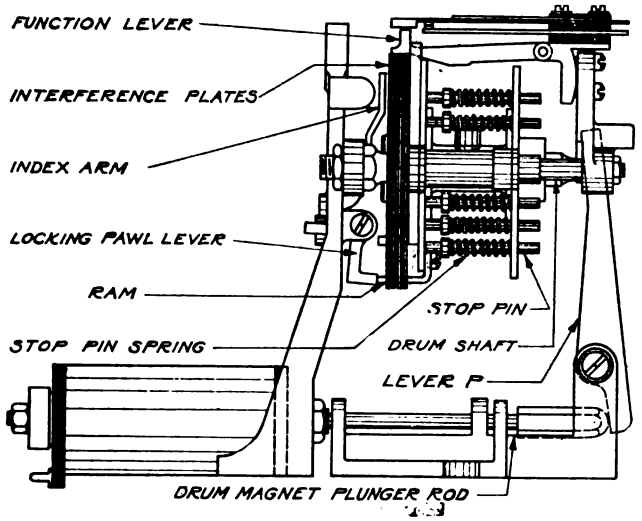


FIGURE 25. SELECTOR MECHANISM.

*Selecting Mechanism.*—The selecting mechanism is controlled by the five selecting magnets, located at the rear right hand corner of the printer.

Selecting magnets 1, 2, 3 and 5 correspond with the first, second, third and fifth intervals of the code, and control, through triggers and springs, four interference plates mounted on the selector.

*Selector.*—The selector consists of a drum carrying a number of stop pins, and mounted so as to slide upon two horizontal shafts (Figure 25). Mounted at the left of the drum are the four interference plates mentioned above. Each of these plates is perforated with a different combination of holes and the edge of each plate is slotted. The interference plates are so mounted that the operation of any selecting magnet will rotate its corresponding plate slightly in a clockwise direction.

The movement of one or several of the plates to the operated position will either line up the holes of the four plates to permit the passage of two pins, one on either side of the center, or line up the holes for a pin on one side and the notches on the edges of the plates beneath a function lever. The operation and purpose of the function levers will be explained later.

The stop pins are held against the left hand plate of the drum by springs. When the drum magnet operates, its plunger presses against the lower part of the pivoted lever P, pressing the upper part of the lever against the drum and moving the drum to the left. The stop pins are carried with the drum, and where a hole is lined up through the four interference plates the pin passes through. Where no holes are lined up the pins are blocked and the springs yield. The drum always makes its full travel.

On the right hand end of the gear shaft is fixed an arm known as the index arm (Figure 26), and as the gear shaft is revolved by the segment this index arm rotates either to the right or left across the face of the interference plates. It is evident that a stop pin projecting through the plates in the path of the index arm will arrest its rotation and thus the rotation of the typewheel.

As there is a stop pin in the drum for each letter on the typewheel (with the exception of the letters "J" and "Z"), the letter corresponding to the stop pin against which the index arm is stopped will be in printing position.

The stops for the extreme rotation letters "J" and "Z" are the opposite edges of a bent up portion of the drum front plate.

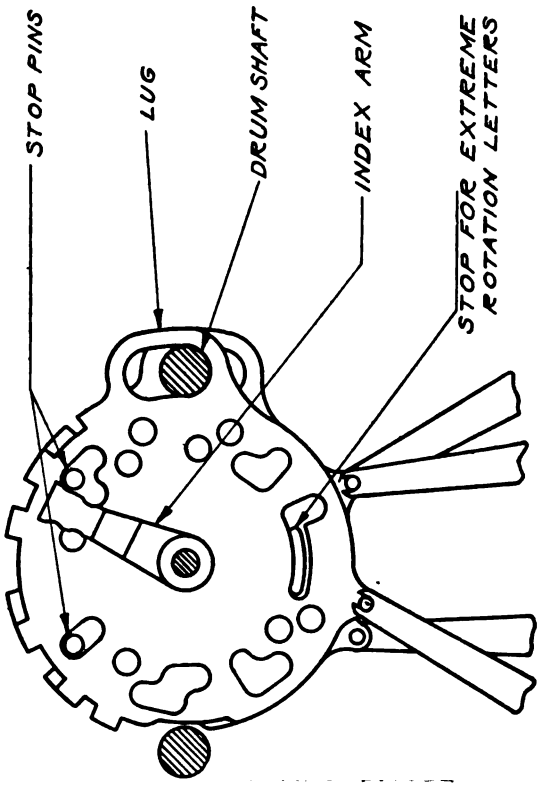


FIGURE 26. INDEX ARM AGAINST STOP PIN.

The interference plates are moved as follows:

In a lug at the bottom of each plate is set a short pin A, at right angles to the face of the plate. This pin fits in the slot at the top of a long lever C, which is attached at the bottom to shaft D. Pinned to this same shaft is a short lever E, against the lower end of which presses a spring F which tends to rotate the shaft, and through the lever C to rotate the plate in a counter-clockwise direction.

*(To be continued.)*

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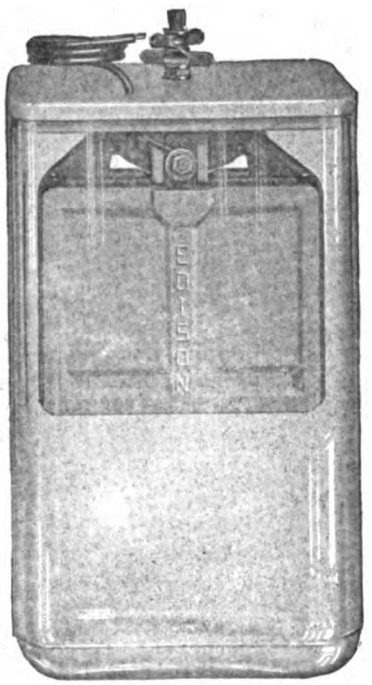
# FOR CLEAR TRANSMISSION

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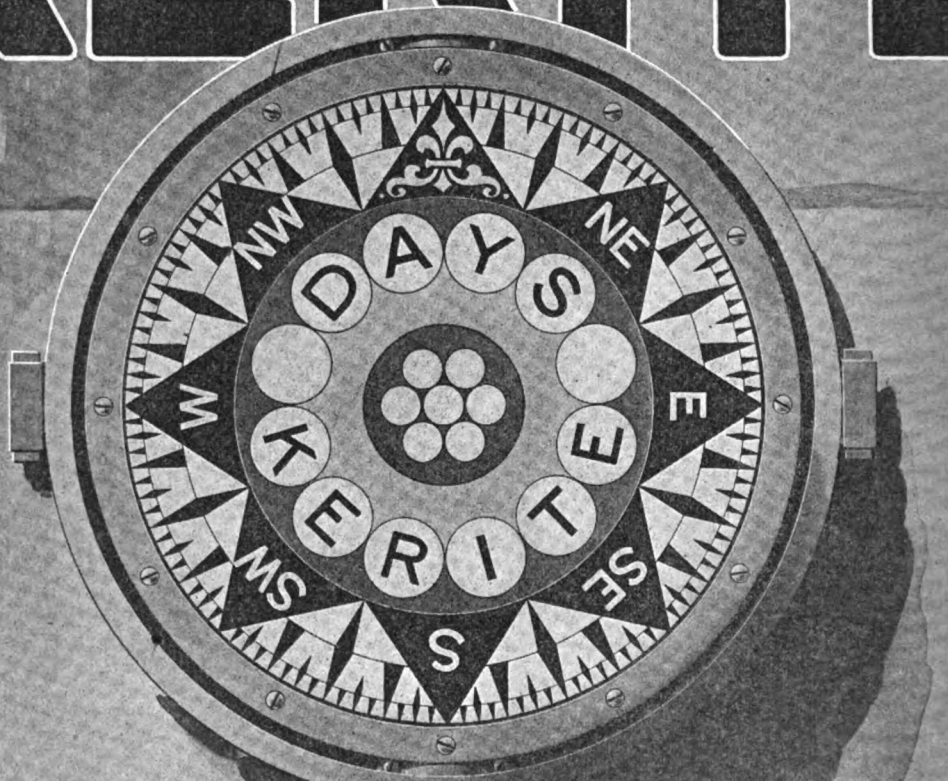


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# THE RAILROAD
## TELEGRAPH AND TELEPHONE

### J. E. Fairbanks

GENERAL SECRETARY AND TREASURER, AMERICAN RAILROAD ASSOCIATION.

Mr. J. E. Fairbanks, general secretary and treasurer of the American Railroad Association, entered the service of the Association on April 21, 1892, in a clerical capacity under the late W. F. Allen, then Secretary of the Association.

At the time of Mr. Fairbanks' entrance in its service, the Association had but five committees,

J. E. FAIRBANKS.

including the Executive Committee. Col. H. S. Haines, vice-president of the then "Plant System," was president and Messrs. Lucius Tuttle, later president of the Boston & Maine, and E. B. Thomas, later president and chairman of the Lehigh Valley, were vice-presidents. The American Railroad Association at the present time consists of seven sections, with about one hundred and fifty committees.

In the spring of 1895 Mr. Fairbanks was appointed assistant secretary and assistant treasurer, and in 1908, when the Association was reorganized and its scope enlarged, he was elected assistant general secretary and assistant treasurer.

In November 1915 he was elected general secretary and treasurer of the American Railway Association, succeeding Mr. W. F. Allen, deceased.

Mr. Fairbanks, always intensely interested in the advancement of railroading, has taken an active part in the working out of the details in connection with the amalgamation of the several voluntary organizations into the American Railroad Association, and at the meeting of the Executive Committee in June 1919, at which time the officers of the amalgamated Association were elected, he was chosen general secretary and treasurer.

During the past year Mr. Fairbanks' name has become familiar to hundreds of railroad telegraph officials in the United States and Canada, and it affords us pleasure to publish his photograph and the foregoing brief sketch of his connection with the American Railroad Association.

In railroad circles it is generallly conceded that there is not another man in the country who has done more to bring about concentration of effort along the lines of railroad operating advancement than has Mr. Fairbanks. Since the amalgamation of the old Association of Railway Telegraph Superintendents with the American Railroad Association in June, 1919, Mr Fairbanks has taken a keen interest in the activities and aims of the Telegraph and Telephone Division.

### Northern Pacific Railroad.

TELEGRAPH SERVICE on Northern Pacific lines was interrupted on November 10 and 11, due to a blizzard. In one stretch of line in Minnesota alone, 215 poles were broken down and 600 wire breaks occurred.

H. G. SCHMIDT, for many years operator in the Tacoma, Wash., relay office, is on a vacation, visiting relatives in Wisconsin. While away Mr. Schmidt will visit friends in New York, New Orleans, Galveston, and Washington. He has been in the service of this company continuously during the past twenty years.

OPERATORS WOODLEY AND BUNNELL of the St Paul, Minn., relay office joined the nimrods during the hunting season, each man returning with a deer.

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THE following changes have been made in equipment inspectors, effective November 24: J. B. Johnston, transferred from Livingston, Mont., to Spokane, Wash; H. M. Hewitt, transferred from Glendive, Mont., to Livingston, Mont.; Charles Varney, appointed to fill the vacancy at Glendive.

THOMAS GRACE has been appointed telegraph foreman of a recently organized construction crew.

### Retirement of a Pioneer Telegrapher.

On the evening of November 29, the employees of the telegraph department of the Trenton Division, Pennsylvania Railroad, tendered a reception to Augustus C. Hoffman, veteran telegraph operator, in the Pennsylvania Railroad Y. M. C. A. Building at Trenton, N. J.

Mr. Hoffman was born in the year 1849, and has been employed as a telegrapher since 1866; fifty years continuously in the service of the Pennsylvania Railroad.

At the reception given him upon his retirement from active service, Mr. Hoffman was presented by his associates with a leather rocking chair, and a handsome watch charm suitably engraved. The secretary of the Young Men's Christian Association presented him with a life membership ticket.

The arrangements for the testimonial were made by G. W. Shoester, division operator of the Pennsylvania Railroad at Trenton, assisted by Messrs. Frank Sutts, W. A. Sine, C. J. Applegate, B. A. Clark and Frank Leedom. More than fifty Pennsylvania railroad telegraphers attended the reception

SHEFFIELD SCIENTIFIC SCHOOL, Yale University, New Haven, Conn., has extended its engineering work to include up to date instruction in telegraph engineering. Complete modern equipment for the operation of single lines with repeaters, Morse duplex circuits and quadruplex Morse circuits, has been installed. The instruction work in this department is under the direction of Professors H. M. Turner and H. V. Bozell.

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### Central and South American Telegraph Notes.

BRAZIL.—The Telephone Company, Rio Grandense, of Porto Alegre, has secured a loan of 2,000 cantos to cancel its floating debt and improve its lines and offices. The loan is contracted by an issue of 13,500 bonds of 200,000 reis, nominal value each, with eight per cent annual interest and two per cent annual amortization.

MEXICO.—During the past year the means of telegraph communication were improved materially. Fifteen new telegraph offices were opened for public use. The number of messages sent and received totaled 12,102,286. There were 1,879 kilometers of new lines constructed, 11,398 kilometers of lines repaired, and 4,753 kilometers of line damages corrected. The extent of the telegraph system of the Republic at the present time is 87,117 kilometers.

During the year seventy-six permits were granted for the construction of private telephone lines.

NICARAGUA.—The director general of telegraphs and telephone has ordered the construction of a line from Managua to Matagalpa via Boaco.

In order to reduce the cost of communication between the departments not connected by railroad, where the mail service is slow, the director general has decided to establish a night lettergram service from offices now having night attention.

### Pulling Wires.

He was an expert telegrapher, sent by the Peace Commission to take over wires, that through the complicated political situation had ceased to exist, and he was having an awful time making his mission known to the polyglot local officials of Sjabadka, Slovakia.

In the uniform of an American sailor, with his sea-pack on his shoulder and a gay Red Cross bag under one arm, he swung along at a sea-going gait, followed by a motley crowd in gypsy coats and bizarre, embroidered waistcoats.

"What in the world are you doing here?" said an American Red Cross officer, as the sailor paused in one of the city squares to find his bearings.

"Well, if it isn't the Red Cross," was the answer, "always turning up when you need it. I'm going to Budapest to take charge of a wire for the Peace Commission, and I need some help."

So he told his troubles to the Red Cross, as the man in uniform had formed a habit of doing, because going from Belgrade to Budapest required all sorts of languages and much conversation, and the sailor lad was having a pretty hard time.

Then the Red Cross man did some wire pulling himself, and gave him letters to the French military commissions all along the route. As the train, which was scheduled to leave at eleven, and finally pulled out at twelve, moved slowly away, a Yankee voice called back admiringly: "Wouldn't you know you'd make port when the Red Cross had you in tow?"

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# CONVENTION OF TELEGRAPH AND TELEPHONE DIVISION, AMERICAN RAILROAD ASSOCIATION, HELD IN CHICAGO, DECEMBER 3, 4 AND 5.

The meeting of the Telegraph and Telephone Division of the American Railroad Association held in Chicago, Decemer 3, 4 and 5, was attended by representatives from practically all railroads in the United States and Canada.

The next meeting of the Division will be held in St. Louis, Mo., March 30, 31, and April 1, 1920, and the next annual meeting and election of officers will be held in Winnipeg, Man., September 22, 23 and 24, 1920.

At the meeting of the Committee of Direction held in Chicago, December 2, several changes were made in the membership of technical committees. E. L. King was appointed to membership in subcommittee A, "Maintenance and Construction of Pole Lines." I. C. Forshee was appointed vice-chairman of Committee No. 2, "Construction and Maintenance Inside Plant." B. J. Schwendt was appointed chairman of Committee No. 3, "Protection Against Electrolysis," vice William Bennett. G. H. Mayer and P. Norton were appointed to membership in Committee No. 4, "Protection Against Lightning or Electric Light and Power Circuits."

A committee appointed since the last general meeting is known as Committee No. 7, having in hand the subject of "Inductive Interference." The membership of the committee consists of E. L. King, chairman, and Messrs. L. Behner, I. C. Forshee, Stanley Rhoads and H. A. Shepard. This committee presented an excellent report at the Chicago meeting.

In the report of the Committee of Direction several matters are discussed which refer to the attitude of the Division in cooperating with other interests engaged in the same or similar lines of work.

The report says, in part:

The Committee of Direction has given consideration to the attitude that the Division should take toward—

(a) Western Union Standards.
(b) American Telephone and Telegraph Company's Standards.
(c Standards of other companies in a similar line of work.
(d) Other Divisions and Sections of the American Railroad Association engaged in a similar line of work.
(e) Bureau of Standards and State Commissions, and
(f) Use of manufacturers' code numbers in connection with reports and specifications of the committees.

and the following action was decided upon:

(a) In writing specifications, rules and regulations covering property on railroad right-of-way, which property is owned wholly or in part by the commercial companies with which the railroads have contracts, the standards of the telegraph companies must be thoroughly considered and every reasonable effort made consistent with railroad interests to agree with the commercial companies as to the proper standards to follow.

It should be borne in mind that while the interests of the railroads and the commercial companies are not at all times identical, the Telegraph and Telephone Division should endeavor to co-operate with and heartily welcome the co-operation of the commercial companies.

(b) Due to the fact that the American Telephone and Telegraph Company and its associated companies are in a similar line of work, as the work handled by the telegraph department of railroads, the Telegraph and Telephone Division should co-operate with and heartily welcome the co-operation of the telephone companies.

(c) The Telegraph and Telephone Division should co-operate with and heartily welcome the co-operation of other companies engaged in a similar line of work.

(d) While it is understood that the Telegraph and Telephone Division controls and will handle all railroad matters belonging and peculiar to the telegraph departments of railroads, it is further understood that the Telegraph and Telephone Division will co-operate and will welcome the co-operation of other committees and sections interested in certain phases of the Telegraph and Telephone Division's work.

(e) Due to the fact that the Bureau of Standards is trying to secure the adoption of safety rules to be used in all parts of the United States, some of these rules affecting the telegraph and telephone departments of railroads, the Telegraph and Telephone Division should make every effort to co-operate with and heartily welcome the co-operation of the Bureau. The Telegraph and Telephone Division should make every reasonable effort consistent with railroad interests to agree with the Bureau of Standards as to the proper standards to follow.

The Telegraph and Telephone Division should keep in touch with the work of state commissions in connection with questions in which the Telegraph and Telephone Division is interested and aid and assist the commissions with a view to securing uniformity in standards.

The railroads represented at the meeting, and their representatives are:

Atchison, Topeka and Santa Fe Railroad: H. C. Chace and W. S. Ronk.

Baltimore and Ohio Railroad: C. A. Plumly, E. W. Day, B. F. Thompson, J. L. Nichols and J. H. Young.

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Bessemer and Lake Erie Railroad: F. W. Smith and L. J. Henderson.
Boston and Abany Railroad: A. R. Belmont.
Boston and Maine Railroad: R. R. Stackpole.
Buffalo, Rochester and Pittsburg Railroad: E. W. Kolb.
Canadian Pacific Railway: A. C. Fraser.
Central Railroad of New Jersey: F. G. Sherman.
Chicago and Alton Railroad: S. U. Rhymer.
Chicago and Eastern Illinois Railroad: Charles Mac Cormack.
Chesapeake and Ohio Railroad: H. C. Peterson.
Chicago and Northwestern Railroad: William Bennett.
Chicago and Western Indiana Railroad: L. B. Abbott.
Chicago, Burlington and Quincy Railroad: C. A. Worst, C. W. Fraher, W. S. Hemphill and C. H. Martin.
Chicago, Great Western Railroad: G. O. Perkins.
Chicago, Milwaukee and St. Paul Railroad: E. A. Patterson, A. C. Adams and A. A. Birler.
Chicago, Rock Island and Pacific Railroad: G. D. Hood, A. W. Douglas and F. K. Kahl.
Chicago, Terre Haute and S. E. Railroad: F. H. Van Etten.
C. C. C & St. L. Railroad: C. S. Rhoads, J. G. Gilgrist, J. L. Niesse.
Colo. & Sou. Railroad: J. L. Henritzy.
Denver and Rio Grande Railroad: J. M. Walker.
Denver and Salt Lake Railroad: C. A. Parker.
Duluth and Iron Range R. R.: M. H. Brickley.
Elgin, Joliet and Eastern Railroad: V. W. Brooks.
Erie Railroad: E. P. Griffith, R. H. Corson and F. H. Menagh.
E. P. & S. W. Railroad: M. O. Scobee.
Grand Trunk Railroad: H. Hulatt, W. J. Rooney, F. T. Caldwell, and A. P. Linnell.
Great Northern Railroad: J. C. Rankine, A. W. Mc Kay and R. C. Thayer.
Gulf, Colorado and S. F. Railroad: J. Matthews.
Hocking Valley Railroad: B. J. Schwendt.
Illinois Central Railroad: F. T. Wilbur, E. A. Burkitt, B. Weeks, Horace Johnson, G. R. Stewart and Don Davis.
Kansas City Southern Railroad: R. Hooper.
Lehigh Valley Railroad: J. F. Caskey.
Long Island Railroad: L. S. Wells.
Louisville and Nashville Railroad: R. R. Hobbs.
Maine Central Railroad: J. B. Norcross.
Soo Line: G. H. Mayer.
Michigan Central Railroad: J. J. Ross, and W. A. Jackson.
Missouri, Kansas and Texas Railroad: W. H. Hall, R. A. Hendrie and J. E. Bell.
Missouri Pacific Railroad: E. A. Chenery, Worth Rogers, C. E. Wynne.
Mobile and Ohio Railroad: J. B. Murphy and J. E. Barber.
New York Central Railroad: E. C. Keenan, R. F. Finley, S. L. Van Akin, Stanley Rhoads, A. Behner, J. C. Deck, T. S. Christy and A. A. Dawson.
New York, New Haven and Hartford Railroad: H. A. Shepard.
Northern Pacific Railroad: M. J. Hansen and H. C. James.
Norfolk and Western Railroad: G. W. Jett.
Northwestern Telephone and Telegraph Company: L. H. Jenks.
Pennsylvania Railroad: G. A. Cellar, J. C. Armstrong, I. C. Forshee, G. A. Dornberg, J. H. Ditch, L. Behner, J. V. Lowery, M. R. Greenamyer, George B. Schroyer, G. W. Shoester, W. S. Logan, W. R. Smith, John Miller and D. C. Daley.
Pennsylvania & Reading Railroad: L. D. Shearer.
Pittsburg and Lake Erie Railroad: L. A. Lee and A. E. Runst.
Richmond, Fredericksburg and Potomac Railroad: T. R. Gooch.
Seaboard Air Line: W. F. Williams.
St. Louis and San Francisco Railroad: J. H. Brennan and C. H. Williamson.
Southern Railroad: J. A. Jones and A. W. Beauprie.
Southern Pacific Railroad: E. L. King, Percy Hewett, W. R. Birt, J. P. Watson and W. S. Melton.
Spokane, Portland and Seattle R. R.: H. M. Huston.
Terminal Railroad of St. Louis: F. E. Bentley.
Union Pacific Railroad: P. F. Frenzer and John Hilbert.
Wabash Terminal Railroad: John T. Nolan.
Wabash Railroad: J. P. Church.
Wheeling and Lake Erie Railroad: P. Vlirt.
American Railroad Association: W. A. Fairbanks and J. C. Caviston.

Affiliated members: J. E. Dempsey, president, Dempsey Systems, Chicago; W. A. Watt and H. W. Drake, Western Union Telegraph Co.; H. L. Krum, Sterling Morton and J. O. Carr, Morkrum Company, Chicago; C. E. Davies, Great North Western Telegraph Company, Toronto, Ont.; E. V. Andrews and C. A. Wharton, Western Electric Company; A. F. Eyerman, Southwestern Bell Telephone Company; George M. Dodge, Valparaiso, Ind.; Arthur Lockwood, Brookfield Glass Company; B. A. Kaiser, American Telephone and Telegraph Company, New York; D. R. Day, Hall Switch and Signal Company; W. L. Cook, president Reliable Electric Company, Chicago; J. A. Hamilton, W. H. Fenley and G. A. Graber, Kerite Insulated Wire and Cable Company; O. F. Cassaday, L. S. Brach Mfg., Company, New York.

## Committee No. 6.

### MESSAGE TRAFFIC.

In the report presented by Committee No. 6 at the Chicago meeting the following recommendations are incorporated:

### EDUCATION COVERING PROPER USE OF TELEGRAPH FACILITIES

### TRAFFIC SUPERVISOR.

It is recommended that trunk line railroads create

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the position of Telegraph Traffic Supervisor reporting to the head of the telegraph department who will in addition to other duties delegated to him by such department head, act in the capacity of official censor. Such censoring shall be done over the signature of the directing head of the railroad rather than over the signature of the head of the telegraph department. His duties shall be largely along educational lines. Such traffic supervisor, in addition to supervising the message traffic and the conduct of the telegraph business of the various offices, will handle such other matters as may be delegated to him from time to time by the head of telegraph department. The committee recognizes the fact that censoring and brevity is a matter which can only be brought about through education of officials and employees who use the telegraph and telephone. To that end the recommendation of the committee should be addressed to the various directing heads of railroads and sent under personal cover in order to secure the necessary co-operation to bring about results. In referring back to the department heads the telegrams which have been censored, this should be done over the signature of the operating head of the railroad in whose office the files will be kept and to whom the replies must be made. After which they will be referred to the telegraph department for such further action as may be deemed necessary.

The dual position of traffic supervisor and censor shall be held by a man of sound judgment, who must be tactful and thoroughly familiar with telegraph matters, including equipment.

The committee recommends that the traffic supervisor in his visits should include a statement of the cost of handling telegraph communications within the large relay or general offices and that such office compile a comparative monthly statement.

It is recommended that all departments be instructed to send copies of all commercial telegrams to the head of the telegraph department daily for his information in connection with the supervision of commercial accounts, contract allowances and also necessary action on the part of traffic supervisor or in the event of abuse of the privileges. Without the information gleaned therefrom, the head of the telegraph department is unable to keep in touch with such matters, as contract messages do not reach him for checking purposes for a period of four months and over after transmission. This permits unnecessary and expensive use of commercial service, overrunning of free allowance, etc.

Censorship analysis for educational purposes, along lines of brevity, is considered desirable, referring censored messages back to senders to indicate the number of words that could be eliminated from each message, as well as the number of characters. This for the reason that in routine telegraph practice, words containing the smallest number of characters, as well as the minimum number of words, should be used.

The committee recommends a centralized method of car tracing. The practice at present is for the transportation and traffic representatives to promiscuously wire superintendents and yardmasters at various terminals over a designated territory in tracing freight. Ninety percent of such telegrams unnecessarily add to the burden of telegraph wires and delay other more important business. Car tracing should be delegated to one bureau on each railroad. Tracers should not be sent except in cases where freight is overdue and only after the regular manifest or passing reports in general use have been consulted in an effort to locate cars. Where it is necessary to trace instead of wiring all terminals enroute, as a general thing, cars can be located by simply addressing one message to a particular terminal and further tracing of the car should not be done until the reply has been received from the terminal addressed. Car tracers should not be jointly addressed, requiring duplication of replies. It should either be addressed to the superintendent of the division or the terminal yardmaster. It is recommended that these matters be directed to the personal attention of the operating head of railroads in order that something more than the mere adoption of this recommendation may be brought about.

It is desirable that on railroads where division and safety meetings are held that the traffic supervisor, telephone inspectors and division linemen be invited to attend the same, presenting an excellent opportunity for the telegraph department to place before the rank and file, first, by presenting data at such meetings and, secondly, by the distribution of the minutes thereof, valuable information referring to and affecting the inside and outside units of the telegraph department relative to changes, improvements, safety first and various other matters in which the telegraph department and other departments of the railroads are mutually interested and concerned. It has not been the practice on some railroads to give very much consideration to the telegraph departments at safety or division meetings. The exploiting of thoughts and ideas at such meetings will eventually bring to the telegraph department recognition of its important functions by those who depend upon it in a general way in the matter of railroad operation, the necessity for improvements, economical handling of line and office changes, efficient maintenance, overhead and side clearances, etc., requiring co-operation.

### TELEGRAPH OPERATORS' EXAMINATION ON SWITCHBOARD MANIPULATION.

At every point where telegraph operators are employed, an examiner will be appointed from the regular staff to examine applicants both orally and in writing as to their proficiency in handling telegraph and telephone test panel switchboards and telegraph peg switchboards. The examination shall include instructions on test panel units, wherever a test panel unit may be located at the office to which applicant may be sent.

A form will be used for a written examination on both types of switchboards, which shall be supplemented with an oral examination on peg switchboards, of the following questions:

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(Examiner will be provided with a dummy switchboard of eight or ten straps to which one set of instruments connected to battery shall be attached.)

1. What would be the result if one of these pegs fell out of this switchboard?
2. Do you know that a peg placed loosely in the switchboard causes a high resistance connection, and in many instances is a cause of poorly working wires?
3. Why should a switchboard peg be kept bright? What would result if you had dirty and greasy pegs in your switchboard?
4. What would result if water was thrown on the switchboard?
5. In some stations switchboards are located close to windows. Open windows near switchboards should be watched or closed during rain storms to prevent rain blowing in on switchboard.
6. Do you understand the importance of keeping all switchboard and instrument binding posts tight?
7. It often happens that the wires in the binding posts of switchboards become broken within the binding post. Whenever a wire chief is testing your office for an open, a slight pull on the leading in wires at top of board would develop whether a condition of this kind existed.
8. Trace on board the path of current flowing in wire No. 1.
9. Point out the actual connection that is made by the insertion of pegs.
10. Point out the actual use of the horizontal strap and screws on the back of this board.
11. If a wire chief asked you to remove both wires from the top binding posts on wire No. 1, what would be the result if you reversed these wires in placing them back in the switchboard?
12. Why does it not cross all wires in your board when you have them cut out at the bottom of your switchboard, and why does it cross them if you did this on an instrument strap?
13. Where is the ground strap on this board?
14. Why does the ground strap not cross all wires in the switchboard?
15. Of what use is the ground strap and the ground connection, other than to ground the wires with pegs, on the wire chief's instructions?
16. What is the meaning of the signal "wire" and who is authorized to use it?
17. Do you understand that the signal "wire" takes preference over all other telegraph traffic, except automatic time?
18. Do you understand that you are to answer to the signal "wire" immediately, and give your entire attention to the instruction from the wire chief, in preference to all other duties, excepting train order signal "9"?
19. Watch your switchboard closely, and see that no pegs have dropped out from the vibration caused by passing trains, and keep all binding posts tight, making it a habit to test them each morning.

### NUMBERING MESSAGES.

The committee recognizes the fact that it has long been the desire of the telegraph profession to have rules which would establish a maximum hourly average to be transmitted per man regardless of the condition of the circuit. The committee feels that in reducing the number of lines constituting a message or establising a specific maximum per hour for telegraph operators that we are making a serious mistake and inviting a minimum service for a maximum pay. For purpose of averages, lines constituting numbers should be increased rather than decreased on account of so many messages being less than one line. It is assumed that under the new method of counting, that out of 3,000 messages it will equal at least one operator's time. The committee desires to recommend that not more than one number for messages of five lines or less be taken and messages containing over five lines to be counted on the basis of one number for each three lines or fraction, and numerals to be based on approximately the same ratio. A line is assumed to contain 10 words.

### DEFERRED SERVICE.

It is an established fact that railroad telegraph facilities by reason of increased use of the telegraph generally in the conduct of railroad business circuits have become so thoroughly congested that it is now necessary to either build additional facilities at great expense or devise ways and means of expeditiously handling the necessary telegraph business with facilities available. To this end serious thought has been given to the "deferred message" plan, it being recognized that a large number of telegrams are filed daily of such urgent nature that the handling by traingram or railroad mail would defeat the purpose intended. There is no necessity, however, for placing a large number of such messages ahead of really urgent business, and that many of such telegrams if in the hands of addressee either by closing time or early the following morning would serve their purpose and the fact that there is nothing now before telegraph operators to enable them to distinguish as between unusually urgent business and business that could well be deferred for a reasonable period; therefore, it is recommended that the deferred service plan be adopted and that messages filed before 3 P.M. and marked deferred will ordinarily reach their destination by closing time and that messages filed after 3 P.M of the deferred class and so marked will either reach destination on that day or in time to be in the hands of the addressee by opening hour of business the following morning. This will enable the telegraph department to dispose of urgent and necessary business within the working day and enable its force to discriminate as between urgent messages and non-urgent messages and still provide the users of the railroad telegraph facilities with adequate telegraph service. It is not considered advisable to place a time limit on deferred messages, it being assumed that such messages filed during the day will reach destination within the business day. The letters "D. S." indicating deferred service messages, shall be transmitted with deferred service messages, following transmission

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of the filing time. It is recommended that a standard combination telegraph blank be used.

In order to bring about a more expeditious method of dictating, transcribing and filing telegrams, the committee recommends that parties dictating telegrams to stenographers insist upon the stenographers showing thereon in the space provided time dictated and time transcribed. This in order to cut down the unreasonable elapsed time now noted between the time telegrams are given stenographers and the time they are written or filed in the telegraph office. Instead of holding messages up for unlimited periods after they have been transcribed, the chief clerk or his duly authorized represenative must promptly scrutinize and pass them to the telegraph office where the filing time will be placed thereon. This will give an absolute check as between the time the telegram was dictated and time it reached the telegraph office, which will largely eliminate the claim of necessary late filing of business, which must necessarily be worked off on overtime after the regular force maintained has completed its day.

MATTERS SUBMITTED AS SUGGESTIONS AND FOR INFORMATION.

Desirability after government control terminates of continuing existing circuit arrangements between important points via different railroads for interchange of railroad telegraphing, provided contracts with commercial companies permit.

At big centers and terminals the railroads maintain large telegraph offices and branches, the use of telautograph equipment between such offices is suggested, thus reducing the expense of maintaining operators and messengers.

Symbols on commercial messages should be controlled largely by local conditions, but in no case should symbols be applied to commercial messages addressed to private individuals or firms. Correspondence file numbers should not be used on either commercial or railroad messages.

PROGRAMME OF FUTURE STUDIES TO BE UNDERTAKEN BY COMMITTEE

Use of printer telegraphs, their supervision and operation from traffic standpoint.

The question of delivery of commercial telegams at way stations where telegraph companies do not maintain messengers.

Desirability of telegraph messengers employed in general offices not only delivering telegrams, but also systematically picking same up.

Development of a scheme tending to ncrease generally the education of employees and particularly along technical lines.

The committee, in this connection, would like to receive by mail from members of the Division any information regarding practices in effect on their roads, or any ideas they may have on such subjects.

It would also appreciate receiving suggestions of other traffic problems which the Division would care to have studied and reported upon.

Committee No. 6 consists of H. Hulatt, chairman, and Messrs. F. E. Bentley, H. C. Chace, P. F. Frenzer, W. H. Hall, R. R. Hobbs, G. D. Hood, E .L. King, A. P. Linnell and F. T. Wilbur.

## THE TELEPHONE.

THOMAS J. FEENEY has been appointed assistant to the president of the New England Telephone and Telegraph Company. Mr. Feeney will have charge of matters relating to personnel.

H. C. CARPENTER has been appointed chief engineer of the New York Telephone Company, vice E. F. Sherwood, appointed vice-president.

J. A. STEWART has been elected a director, first vice-president and general manager of the New York Telephone Company.

P. C. STAPLES and G. J. Elliott have been appointed assistants to the president, Bell Telephone Company of Pennsylvania, with headquarters at Philadelphia.

A. E. BERRY has been elected president of the Chesapeake and Potomac Telephone, vice F. H. Bethell, resigned. Mr. Berry is also a director of the company.

E. M. GLADDEN, Detroit, Mich., has been appointed general commercial superintendent of the Michigan State Telephone Company.

S. A. RHODES, acting chief engineer of the central group of Bell Telephone Companies, has been advanced to the position of chief engineer.

GEORGE S. REINOEHL, formerly district manager of the Bell Telephone Company, Reading, Pa., has been appointed division manager at Philadelphia, Pa.

C. F. BRISBIN, formerly district manager, at Wilkes-Barre, Pa., for the Bell Telephone Company, has been appointed division manager at Harrisburg, Pa.

H. L. BADGER, formerly division plant superintendent at Pittsburg, Pa., for the Bell Telephone Company, has been appointed general superintendent of plant for the same company at Philadelphia, Pa.

CARL W. ERICKSON, of the long lines department, American Telephone and Telegraph Company, Little Rock, Ark., has had many years' experience in the telegraph and telephone business. Mr. Erickson began his telegraph career about eighteen years ago in the Minneapolis, Minn., main telegraph office of the Soo Railroad.

THE MUTUAL UNION TELEGRAPH COMPANY was organized October 4, 1880, with a capital stock of $600,000.

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# QUESTIONS AND ANSWERS

### Logarithms.

A. R. J.—The following is an example of the use of logarithms in electrical calculation:

The area in circular mils of a weather-proof copper wire of an allowable capacity of 185 amperes under Fire Underwriters' Rules, may be expressed (closely) by:

$$A = \left(44.8 \sqrt[3]{\frac{185^2}{90}}\right)^2$$

Notice the process in the case of this rather complex formula. Begin with the 185 and write this skeleton, and *then* fill in the three mantissas and perform the operations indicated.

| | | |
|---|---|---|
| log 185 | = 2. | |
| × 2 | | to square |
| R 90 | 2. | to divide by 90 |
| Sum | | (*"always sum"*) |
| ÷ 3 | | to extract cube root |
| log 44.8 | 1. | to multiply by 44.8 |
| Sum | | |
| × 2 | | to square. |

Filling in, we get:

| | |
|---|---|
| log 185 | = 2.2672 |
| × 2 | 4.5344 |
| R 90 | 2.0458 |
| Sum | 2.5802 |
| ÷ 3 | 0.8601 |
| log 44.8 | 1.6513 |
| Sum | 2.5114 |
| × 2 | 5.0228 |

= 105,400 circular mils.

### Perikon Detector.

W. M. E.—The Perikon detector used in radio reception was invented by Dr. G. W. Pickard, and consists of two crystals—copper pyrites and zinc oxide. In the assembled detector the crystals are so mounted that they are in firm contact with each other. The detector is of the rectifier type.

### Morse Duplex.

H. H. E.—Our correspondent asks the question: "How will the milli-ammeter in a duplex set act when the distant station 'closed pole' or 'open pole' becomes disconnected?"

In duplex sets where negative potential is placed to line when the pole-changer key is closed, when the home pole-changer is closed the home station differential milli-ammeter will indicate an open positive pole at the distant station by the pointer moving forward one or two degrees farther to the left when the distant p. c. is operated, instead of moving over to the right-hand side of the scale as it would do if the distant end positive and negative poles were both intact.

An open negative pole at the distant end will be indicated on the home milli-ammeter when the home p. c. key is left open, while the distant p. c. key is operated slowly, by the meter pointer dropping back a few points from full right deflection as the distant p. c. is operated. If both poles at the distant station are properly connected, it is plain that the home milli-ammeter pointer will swing from extreme right to left as the distant p. c. is operated.

It is assumed that the milli-ammeter in use is so wound that when both home and distant keys are closed the pointer moves to full left deflection, and when the home key is closed and distant key open, the pointer moves to full right deflection.

### "Reversed Pairs," "Split Pairs."

A. M. G.—What is known as a reversed pair of conductors in a cable, results when the "ring" side of the pair terminates on the tip side, and the tip on the ring side.

A "split pair" results when one side of a pair of conductors is in error spliced to one side of another pair of conductors.

### Selector Failure.

H. B. R.—Failure of a selector to signal may be due to any one of several different causes. A first test would be: Listen-in on the circuit to see if the selector impulses are being transmitted in the line circuit. If the signals are being transmitted correctly, insert a milli-ammeter in the circuit and note if the proper amount of current is flowing. By counting and timing the outgoing impulses it may be learned whether or not the selector key is operating properly. If no impulses are going out, examine the relay while the key is being operated. The relay armature should faithfully follow the opening and closing of the key, and the relay contact points should be clean.

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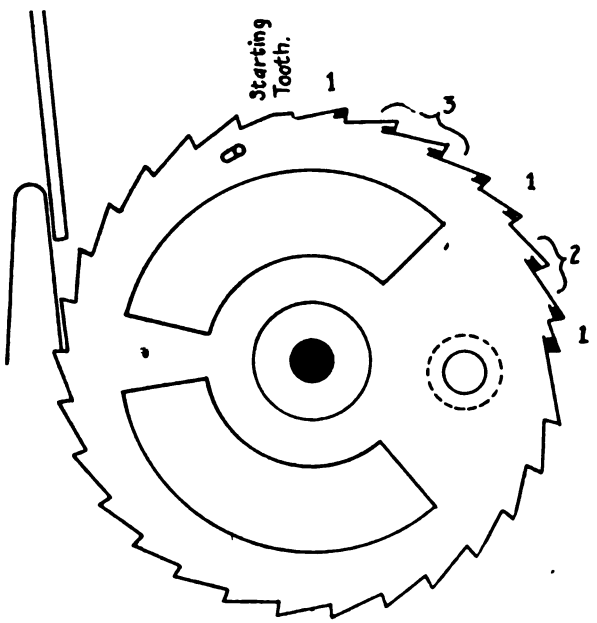
A voltmeter connected across the main battery terminals will indicate the maximum voltage of the battery. Excessive sparking of the contacts of the relay may indicate that the condenser connected across the points is defective. Excessive thumping of the telephone diaphragm may mean that the coil in series with the condenser is open.

### How to Determine the Combination of a Gill Selector When the Combination Number Is Unknown.

(*Answer by Stanley Rhoads.*)

W. T. H.—The sketch herewith shown represents the combination wheel of a five-figure combination as used in the Gill telegraph selector. The position of the driving pawl is indicated. There is a pin opposite the first tooth to the left of the starting tooth. The starting tooth has the top of the tooth filed off flat, as shown in the sketch. The other teeth of the combination are either "top-cut" or "bottom-cut" teeth. These cuts are little slots filed at a slant




GILL SELECTOR COMBINATION WHEEL CUT FOR COMBINATION 13121.

in the edge of the teeth. The "top-cut" tooth will engage the holding pawl between impulses, when the time-wheel rolls down the track, and allows the holding pawl to drop to the bottom of the tooth. The "bottom-cut" teeth will hold the wheel between impulses, at which time the time-wheel does not get a chance to roll down the track, and hence keeps the holding pawl in the upper position where it will engage the top of the tooth which is not cut away.

In figuring out a combination, start with the first tooth to the right of the starting tooth, which will be the first impulse of the combination and count the number of teeth, stopping on the first tooth that has the top cut away. In the sketch shown this would be the first tooth. This indicates that the first figure of the combination is "1." Then proceed to the right, counting the number of teeth until another "top-cut" tooth is encountered—in the sketch this would be three teeth, indicating that the second figure of the combination is "3." Proceed to the right and you will find that the other figures of this combination are "1", "2" and "1." The last tooth of the combination is filed away both top and bottom, and the wheel cannot be stepped beyond this point. The last figure is always "1" in the telegraph selectors.

By using the above as a guide, the combination of any wheel can readily be counted.

### Haze, Mist, Fog, Dew.

C. L. M.—When telegraph wires are fog-bound, sometimes it is impossible to operate circuits of a length greater than forty or fifty miles. Even to maintain satisfactory operation over such relatively short distances often it is necessary to increase the strength of terminal batteries to double the regular voltage.

A haze is a species of vapor in which the watery particles are only partially or imperfectly condensed, producing indefinite obscuration. When the watery vapor in the surrounding air becomes more condensed, with a defined outline in the form of a cloud, either resting upon the surface of the earth or suspended a few feet above it, it is termed a mist.

When the whole atmosphere appears equally obscured, the condition is known as fog. Mists as well as fogs consist of thin vesicles of water containing air, probably created by unequal temperatures at different points in the atmosphere, holding moisture in solution.

Dew is a result of alteration of temperature after sunset, causing condensation. When the precipitation is considerable the cross-arms of telegraph poles have a film or layer of moisture deposited upon their surfaces, as well as that which accumulates upon the surface of the glass insulators, and, this condition existing at each pole, in the aggregate permits leakage of a considerable amount of the current from individual wires into other wires on the same pole-line.

### A "Speaking" Relay.

D. C. V.—There have been quite a number of instances reported where telegraph relays connected in telephone circuits have reproduced voice-tones passing over the line. When this occurs the telegraph relay is performing the functions of a telephone receiver.

Thin relay armatures are more likely to respond than thick armatures. Undoubtedly you have observed that the diaphragam of a telephone receiver is firmly held by the pole-pieces of permanent magnet, and that the diaphragm vibrates only when voice-currents pass through the coils of wire wound around the core extensions of the permanent magnet of the receiver. A telegraph relay armature is susceptible to the same influence.

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# Electro-Physics for the Telegraph, Telephone and Radio Student

No. 19.

### Loading of Telephone Circuits.

We have been dealing with the circuit factors which have a bearing on the distances over which satisfactory telephone communication may be carried on.

From what has been said, it will be apparent that the effects of electrostatic capacity are to limit sharply the range of transmission. The effects of capacity in a circuit is to reduce, for alternating currents, the amount of electrical energy received at the distant end of the line, because each time the voltage changes from positive to negative, and *vice versa*, the two wires of the circuit have to be charged, and the current and voltage will be out of phase with each other, the current leading the voltage.

The electrostatic capacity of an open wire copper circuit, is, under average conditions about .009 microfarad per mile, while the capacity of a No. 19 gage cabled circuit is .066 microfarad per mile.

Elementary electricity and magnetism teach that the variation in the strength of the magnetic field set up about a conductor results from variations in the current strength, and that the magnetic field produces electromotive forces in the conductor which oppose rapid alterations in the current strength flowing in the circuit. This is what is commonly called inductance. Inductance has the opposite effect upon the circuit as has capacity, causing the current to lag behind the voltage.

It is evident that the inductance of a straight wire is negligible compared with the inductance of insulated wire wound into a coil. Further, the inductance of a circuit decreases as the two conductors are brought closer together. This means that conductors carried in cables, being very close together, their magnetic fields are neutralized—the inductance being negligible.

The principle of *loading* has to do with the fact that inductance in coils suitably spaced along a telephone circuit will produce the same effect as uniformly distributed inductance. By this means the desired relations between simultaneous current and voltage values may be established; that is, with regard to "lag" and "lead" of current relative to the voltage.

Since the capacity and resistance of a circuit are uniformly distributed along a line, the ideal condition would be to provide uniformly distributed inductance. So far as cabled conductors are concerned and in telephone work cables must necessarily be used to a large extent, it is explained in the foregoing that along the length of the conductors inductance is negligible.

The loading coil used in modern telephone work gives us "lumped" inductance in the form of coils with iron cores placed at intervals properly spaced and connected in series with the circuit, which imitate exactly the conditions which would obtain if inductance were uniformly distributed.

Loading, or the introduction of properly distributed inductance units in series with the line, besides increasing the amount of energy, or power, delivered at the receiving end over that which would be delivered on an ordinary line, also has the effect of eliminating distortion, which, on a non-loaded telephone line, is caused by a disproportionate dissipation of energy in the line as regards the different frequencies of the voice currents.

In order to apply "lumped" inductance to a line to improve transmission, it is very important that the inductance coils be correctly spaced along the line or they may cause a great deal more harm than good to the transmission. Professor M. I. Pupin, the inventor of the present system of lumped loading, first calculated the proper spacing and inductance for these coils, but a large amount of scientific and engineering work had to be done to successfully apply the principle in practice. These calculations


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require the solution of very complex mathematical formulas. It is not advantageous to place inductance in a telephone circuit beyond a certain value in relation to the other characteristics, as a point is reached where the loss due to the resistance of the coils offsets the value of the increased inductance. Also it is not economical to load beyond a certain point, due to the cost of the coils being prohibitive for the value gained. There are three types of loading employed, known as light, medium and heavy, differing in the amount of inductance inserted and the spacing between coils. For loading cables, the loading coils are placed in light loading 2.2 miles apart, in medium loading 1.66 miles apart, and in heavy loading 1.16 miles apart. On open wire lines the coils are spaced 41,600 feet apart, being placed at "S" poles of the tansposition system.

Loading has more than doubled the transmission distance of telephone circuits. While commercially satisfactory transmission in No. 19 gage cable is limited to about 30 miles, the transmission of this cable when loaded is satisfactory up to 75 miles, and loading a No. 8 B. W. G. copper wire circuit increases its transmitting distance from around 900 miles to 2,250 miles. By loading, smaller conductor can be used with the same or better results as can be obtained by using unloaded conductors of twice the size. Loading, however, has some detrimental effects on the transmission properties of a circuit, especially on open wire lines. One of these is that cross-talk is greatly increased, and another is that there is an increased loss through leakage. These detriments are due to the higher effective voltage in a loaded circuit and impose more stringent conditions which must be complied with by a more complex transposition system, more correct spacing of transposition sections and better insulation of the line.

### TRANSMISSION RANGE.

It has been determined that No. 8 B. W. G. copper wire is about the largest size of conductor that is economically practicable on telephone circuits, since a very small gain in transmission due to the use of a larger wire would cost a great deal for the increased amount of copper.

Prior to the development of the art of loading open wire circuits, the longest practical distance over which commercial transmission of voice currents was possible was about 950 miles (between New York and Chicago) over a No. 8 B. W. G. unloaded circuit. The art of loading had been in use since 1903, and in 1911 the loading of physical and phantom circuits developed to a point where it was possible to greatly extend the distance mentioned above, and a New York-Denver circuit, over 2,000 miles in length, partly physical and partly phantom, was established with a transmission efficiency slightly greater than that of the unloaded No. 8 circuit from New York to Chicago. Since that time the development of intermediate apparatus, known as telephone repeaters, has made possible and practicable a New York-San Francisco circuit of 3,400 miles, which was put into service in 1915.

## Charles Augustin Coulomb.

[Born June, 1736.]
[Died August, 1806.]

Coulomb was born a nobleman, being a member of a noble family of Montpelier, France.

On the very threshold of electrical discovery, the art held out promise of pleasant employment, in such measure, that not only were the most profound thinkers and advanced students of the eighteenth century attracted to the work, but, also members of the nobility, in several instances, saw in the new science a field for investigation worthy of their best talents and earnest efforts.

Instead of electing to lead a life of idleness and ease as he might have done and as many others of his class did in those times, Coulomb, early in life, decided to devote his time and talents to the cause of science.

He distinguished himself by carrying on a series of elaborate and brilliant scientific experiments.

His fame rests chiefly on his most elaborate and important investigations in electricity and magnetism, and on his invention of the torsion balance in the year 1777. This device has since that time been universally used in all delicate researches, particularly in the measurement of electrical and magnetic actions.

Opposing other authorities, Coulomb proved that electricity, like gravity, varies in the inverse ratio of the square of the distance.

His experiments dealing with the dissipation of electricity over the surface of conductors, were original and of great value. He was the first to point out that the dissipation was chiefly due to adhering moisture on the surface of the insulator, but in some measure also to a slight conducting power.

He found that a thread of gum-lac was the most perfect of all insulators, having an insulation ten times greater than that of dry silk thread.

The Paris Electrical Congress of 1881 adopted the name of Coulomb as the practical unit of electrical quantity.

**New RADIO Book**

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# CURRENT EVENTS

## EXECUTIVE OFFICE ANNOUNCEMENTS, PERSONAL MENTION, APPOINTMENTS

### WESTERN UNION TELEGRAPH COMPANY.

NEWCOMB CARLTON, president, on December 5, returned from a business trip to the Pacific coast. He was accompanied by Vice-Presidents J. C. Willever, G. M. Yorke and W. N. Fashbaugh.

T. W. CARROLL, general manager, Eastern Division, was in Philadelphia December 10 and 11, attending a conference of district officials.

ROBERT E. CHETWOOD, plant engineer, has returned from a trip to Ottawa, Canada, where he went on company business.

LOUIS CASPER, general inspector, of Vice-President Fashbaugh's department, has returned from a business trip to Chicago.

E. R. SHUTE, traffic engineer, is in Boston in connection with business of the traffic department.

W. H. FERRIS, of the Washington, D. C., office has been appointed a general inspector, connected with the office of the vice-president in charge of traffic, New York.

ELLARD C. PARKER, of Chicago Robert R. Gilpin of Chicago, and Leandro Rodriguez, of the Richmond, Va., office, have been transferred to Havana, Cuba, for service in the automatic department of the Western Union office.

L. E. JOHNSON has been appointed acting chief operator at Toledo, Ohio, effective December 1, vice J. S. Reichart appointed acting division traffic supervisor, Toledo.

OWING TO A STEADY GROWTH OF TRAFFIC the company finds it necessary to secure larger quarters in Salt Lake City, Utah. A lease has been signed which will provide 22,000 square feet of space in the Clift Building now being erected in the heart of the business district. It is expected that the new offices will be ready for occupancy early in 1920.

AT MINNEAPOLIS, MINN., work has been begun on underground pneumatic tube extensions, which it is planned shall ultimately include all branch office connections with the main office.

### New York Western Union.

THE SERVICE SOCIAL CLUB of Local No. 109, Association of Western Union Employees, will hold its second annual ball at Leslie Hall, Broadway and 83rd Street, New York, on January 24, 1920. Plans are already under way to provide entertainment that will make the evening one long to be remembered by those who attend.

THOMAS COURTENAY, formerly a member of the Commercial News Department, and now radio instructor at Fordham University, New York, was a recent visitor in the main office.

MISS ALICE O'CONNOR, employed in the Commercial News Department at No. 24 Walker Street, is one of the most popular young ladies in the office.

A ROUTING TEST was held in the distributing center at No. 24 Walker Street, on November 5. The winners in the contest were: Miss Coleman, first; Miss A. Eguiguren, second; and Miss A. Braitner, third.

THE FIFTEENTH FLOOR at 24 Walker Street passed through all the thrills of a movie studio on December 5, when the Fox *News* camera man took pictures of the automatic department in action. The First Philadelphia set had the center of the stage, and for the information of telegraph movie fans who will see the pictures on the screens of theatres it may be announced that the close-ups of perforators show Miss Margaret Miller and Miss Rosaond Martin.

THE WIRE CLUB OF NEW YORK held its regular monthly meeting on Monday, December 1, at which time the officers who will serve throughout 1920 were elected. They are H. M. Heffner, president; Paul Eley, vice-president; F. S. O'Connor, secretary; J. Gschwind, treasurer. The Board of Managers consists of: G. C. Gute, I. D. Hough, C. W. Samuels, W. R. Lawrence and W. R. Taylor. Auditing committee: C. S. Pike, E. T. Burrill and E. D. Pitt. Membership committee: T. M. Brennan, P. F. Casey, B. R. Hawley, T. A. McCammon and R. H. Tucker.

A. B. HART and Bernard O. Anson, of the engineer-in-chief's office, British Postoffice Telegraphs, London, who are now in this country making studies of American systems and methods, were shown

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through the main operating department by H. A. Emmons, traffic engineer, and F. S. O'Connor, office engineer.

G. M. WISE, managing director of Jost's Engineering Company, Bombay, India, and J. A. Spiller of Bombay and Tokio, accompanied by A. H. Dyson, consulting engineer of the International Western Electric Company, looked over the operating department recently and were much impressed with the smooth running organization that handles the present large volume of traffic.

H. OLSSON and Axel Hultman, government telegraph officials from Stockholm, Sweden, accompanied by W. Mc A. Smith of the Western Electric Company, visited the operating department recently.

LIEUTENANT J. J. MALONE, of the Australian telegraph service, accompanied by Mr. Rhone of the Western Electrical Company, looked over the operating features of the main office the first week in December. He was praticularly interested in the multiplex plant.

ROBERT H. CRAIG of the Monitorial Department, and one of the most popular members of the main office staff is receiving the congratulations of his associates on a matrimonial venture soon to be undertaken.

## Chicago Western Union.

BERT FORBES, who has been many years in the service, resumed work at the Board of Trade telegraph office recently.

THE VARIOUS DEPARTMENTS of the Chicago district have organized a co-operative association with the object of attempting to reduce the high cost of living. Many applications for membership have been entered, and it is the intention to extend the benefits to out-of-town employees. Beginning with a staple line of groceries, it is the intention later to include shoes, wearing apparel and household goods. E. F. Wach is temporary chairman, until a regular election of officers is held in January.

THE TELEGRAPHERS' BUILDING AND LOAN ASSOCIATION OF CHICAGO is being joined by an increasing number of telegraphers. Those who acquired the saving habit by purchasing liberty bonds, propose now to invest further savings in real estate.

THE CHICAGO OFFICE recently was favored by a visit from General Inspectors H. P. Corwith and C. M. Brentlinger of Vice-President Fashbaugh's office, New York.

L. B. BOUCHER, chief operator of the Grand Rapids, Mich., office is spending a few weeks in Chicago.

J. S. REICHERT has temporarily been appointed division traffic supervisor, vice E. W. Springer assigned to other duties.

THE WESTERN UNION FELLOWSHIP CLUB held a successful banquet on Monday evening, December 8. The following named were elected officers for the coming year: A. C. Johnson, president, M. F. Streider, vice-president, (commercial); F. B. Ford, vice-president, (traffic); J. A. Morrison, vice-president, (accounting); W. A. Rosenbaum, vice-president, (plant), and H. F. Kline, secretary-treasurer.

DIVISION TRAFFIC INSPECTOR NEWLANDER reports the arrival of a daughter in his home.

C. E. DAVIES, traffic superintendent, Great North Western Telegraph Company, Toronto, Ont., was a visitor at Chicago headquarters December 3.

F. T. BEAL, of the sixth floor, section 1, main office, is authorized to take subscriptions for TELEGRAPH AND TELEPHONE AGE. He can procure promptly books on any electrical subject, also sending machines, word counters, etc.

## San Francisco Western Union.

After being located on the corner of Pine and Montgomery Streets, for about thirty-one years, the main office of this company in San Francisco is shortly to be moved to a new location in Merchants' Investment Building, at Geary and Market Streets.

Prior to the time the present office was installed the company's headquarters was on California Street. At the time of the earthquake, in 1906, a temporary main office was established at Oakland Mole, on the east side of the Bay. In 1908, the office was moved back to a corner of Pine and Montgomery Streets; this time the south-east corner.

It has been related that when the present general manager of the Pacific Division, M. T. Cook, arrived in San Francisco to take up his duties here, he landed at the Ferry Building in the evening, and, walking up Market Street, possessed of the idea that the Western Union office should be visible a long way off, was disappointed in his expectations. One version of the incident has it that a policeman Mr. Cook appealed to for direction had to consult the city directory.

However, when the company moves into its new offices in the Merchants' Investment Building next Spring, that accomplishment will signalize the fruition of plans which began to form the first evening General Manager Cook spent in San Francisco.

The offices of the various superintendents already have been moved to the new building; all being located on the fourth floor with the exception of J. L. Ord, superintendent of plant, who is on the fifth floor.

Heretofore the offices of the superintendents were scattered within a radius of several blocks of the main office. The general manager had his offices in the Royal Insurance Building at Sansome and Pine Streets; A. H. May, district commercial superintendent, was located in the same building; C. R. Fisher, division traffic superintendent, and H. J. Jeffs, di-

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vision traffic supervisor, were located in the Stock and Bond Exchange Building, at Montgomery and California Streets; while J. L. Ord, superintendent of plant, was located in the building adjoining the main office. C. A. Rhodes, division auditor, was located in the Russ Building; and E. C. Labadie, division traffic engineer, in the Stock and Bond Exchange Building.

In the new office the Morse department, multiplex department, and telephone department will occupy an entire floor—the fifth—a partition separating the telephone room from the remainder of the space. The wire department, call "Qm," will be on the fifth floor.

The operating room will be thoroughly up to date in all respects. The daytime and night illumination has been planned to meet all requirments.

At the present time there are 165 telegraph lines connected into the main switchboard. The staff in the wire testing department consists of: W. H. Wilson, in charge days; assisted by T. J. Crow, T. Mc Ginnis and F. D. McIntyre. At night W. A. Warrensford is in charge with J. A. Parquette as assistant. G. F. Wilson is in charge during the late night hours.

W. L. Glasheen, formerly chief operator, is now division wire chief; J. E. Mifka, chief operator; C. E. Donnelly, day force chief; A. A. Marlatt, supervisor of overland circuits, assisted by M. Casey, and W. E. Smith is supervisor of way wires.

At night, G. H. Gilbert is chief operator; Frank H. Morris, night force chief, assisted by E. R. L. Jones and F. M. Cuyler as supervisors. In the automatic department, L. P. Grover is in charge days, and C. E. Myers at night.

C. A. Rawlinson is all-night chief, with William Melville as supervisor.

Many of the heavy traffic circuits are now turned into the automtic department—Omaha, Kansas City, St Louis, Denver, Salt Lake City, Dallas, Reno, Chicago, Seattle and Portland.

In the Morse department, duplexes are operated to Sacramento, Fresno, Redding, Tonopah, New York, and other points, and several single wires are worked to Oakland.

To expedite California local business, and to speed up the operation of circuits during foggy spells, Redding office has been made a relay point for Northern California, and Fresno a relay point for Southern California districts.

W. R. Edmondson is city manager, and A. E. Littler assistant manager.

The telegraph historian of the San Francisco district is Clarence H. Ward. His recollections and records include everything of moment that has befallen telegraphers in that territory since the days when the office was located on California Street.

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A. C. TERRY, well known former telegraph official, is now general secretary of the Chamber of Commerce of Pittsburg, Pa. The Pittsburg Chamber is one of the most flourishing and active organizations of the kind in the United States.

**Western Union Atlanta, Ga., Main Office.**

On midnight of November 22, the main operating department of the Western Union Telegraph Company at Atlanta, Ga., moved from its old location to the new Transportation Building at the corner of Marietta and Forsythe Streets. Previous to that date, the Division Offices, which are located at Atlanta, had made their headquarters in the same building, the top four floors of which are now occupied exclusively by the telegraph employees.

The Atlanta office is the fourteenth in the chain of new main offices which have been planned and installed under the direction of the Central Engineering Department during the last six years, and represents the most thoroughly modern type of telegraph office in every respect. The Transportation Building is a ten story, modern, fireproof building, rising above the surrounding buildings to such a height as to insure excellent light and ventilation for the people working within. A well designed semi-indirect lighting system has been provided, and affords the proper illumination at night. Each floor has as an area of approximately eleven thousand square feet, with an exposure on all four sides. The operating room is situated on the tenth floor and is admirably laid out, as regards the working conditions for the employees and the rapid collection and distribution of messages. A complete belt conveyor system is arranged for picking up messages from each individual operator, carrying same to a distributing center in the northeast corner of the room, where they pass before a number of routing clerks, the latter sorting and routing directly to delivery belts leading to various points in the room. The distributing center is also designed to accommodate all branch office and house tube terminals, thus ensuring most efficient handling of business between points served by tube from the operating department.

In the multiplex department there were installed initially three quads, six triples, eight doubles, one single, and thirteen Krum sets, with ample space for growth. Two hundred and seventeen positions were provided initially in the Morse department. An idea as regards the volume of business done in the Atlanta office may be obtained by noting that approximately twenty-eight thousand messages pass through the distributing center each twenty-four hours.

The time service and commercial news departments are also located on the tenth floor. The time service operates at present twenty-four clock circuits throughout the city, and a special feature of this installation is the new type of trouble detecting device on each individual circuit. The commercial news department includes a twenty-four panel, double deck ticker board operating a total of ten ticker circuits, including city and long distance. One of the long distance circuits bears the distinction of being the longest in the country, extending a distance of somewhat over 400 miles.

The ninth floor is given over to the plant, telephone, division traffic, multiplex school, and men's

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locker and rest rooms. The plant department, occupying approximately three thousand square feet of space, has been provided initially with seven sections of switchboard and eight repeater tables, all of the latest type of equipment. The telephone room, adjoining the plant room, is located directly beneath the distributing center on the tenth floor and connected therewith by riser-belt and drop-chute, for the rapid interchange of business. In addition to the regular recording board, Morse telephone positions are provided for the delivery of telegrams by telephone and the handling of business with certain of the branch offices through the same means.

The eighth floor is taken up by the division plant forces, the Morse school and the women's quarters. The seventh floor is occupied by the bookkeeping department, division auditor's and general manager's forces.

### Associated Press Notes.

CHARLES T. THOMPSON, superintendent at New York, has been appointed to take charge, under the chief of the news department, of all service from Europe and Asia. Harold Martin, assistant superintendent, has been appointed to take charge of service with South America.

THE ASSOCIATED PRESS has in service 750 expert Morse telegraphers.

In New York City the A. P. handles 173,000 words daily by means of Morkrum printers.

MANY MORSE telegraphers have successfully taken up automatic printer operation and, due to their thorough knowledge of telegraph traffic, are among the most successful chiefs in charge of printer work. Morse work, however, sometimes attracts printer mechanicians who entered the telegraph service with no idea of taking up Morse work. Daniel MacDonald, for three years a printer operator in the Boston office, took up Morse practice, and has recently been assigned to a position at Johnstown, Pa.

### Mechancial Receiving.

TELEGRAPHER COPIED TELEGRAM ORDERING HIS ARREST.

A press item from Pueblo, Colo., states that H. W. Lovelace, a railroad telegrapher in that city, recently copied from the wire a number of telegrams, one of which was addressed to the sheriff, requesting Lovelace's arrest for impersonating a secret service officer.

The operator placed the message in an envelope and handed it to a messenger boy for delivery. Naturally he was quite surprised, a short time later, when the sheriff entered the telegraph office with the telegram, and placed him under arrest, advising him that he would have to start at once for a neighboring State for trial.

This is a case of "mechanical" receiving that ordinary absent-mindedness does not satisfactorily explain.

## POSTAL TELEGRAPH-CABLE COMPANY

W. C. DAVIET, assistant to the general manager, is on an inspection trip through the east and west.

E. P. TULLY, assistant to the general manager, has returned from a trip through the west.

C. E. BAGLEY, superintendent, Philadelphia, was a recent executive office visitor.

J. P. O'DONOHUE, division electrical engineer, has been to Chicago, visiting Buffalo and Meadville on his return.

CHAS. HITCH of the electrical engineer's department has returned to duty after an illness.

K. L. VERNON, during the past ten years inside wiring foreman for this company in the Eastern Division, has purchased a small estate at McKinley, Isle of Pines, and on December 3 sailed for that place accompanied by his wife.

MANAGERS APPOINTED: Frank Romano, Galesburg, Ills.; Miss M. D. Taylor, Norristown, Pa.; Barbara Thomas, Ontario, Calif.; Marie L. O'Connor, Grants Pass, Ore.; J. E. Caiminati, Cotton Exchange branch, Houston, Tex.; J. G. Charbonneau, Fond du Lac, Wis.; Earl C. Adams, Kokomo, Ind.; J. L. McDowell, Pine Bluff, Ark.; A. M. Sikes, St. Augustine, Fla.; M. E. Friend, Tampa, Fla.; Mrs. J. de Long, Hammond, Ind.; and Mrs. R. C. House, Washington, Pa.

CHARLES A. HOLZER, has been appointed assistant manager of the office at Los Angeles, Calif.

C. B. YOUNG has been appointed manager of the company's office at Wilmington, Del.

### New York Operating Department.

JOHN SHINNDINE, chief route clerk in our Philadelphia office was a recent visitor and spent the day looking over some of our skyscrapers with A. F. Kavanaugh of the service department.

MRS. SHANNON has returned after an illness of six weeks.

LEO GOLDSTEIN, quadruplex chief of our Chicago office, was a recent visitor and after spending several days here, returned via Washington to take in the sights at the Capital.

OPERATORS Irving Rice and Walter Moore have been added to the operating staff at "Fq" office, No. 20 West 45th Street.

### Philadelphia, Pa., District.

MANAGER J. H. WILSON is deserving of credit upon the location in the "automobile district" of a new office on the main floor of the Fidelity Building, 112 North Broad Street. Chas. Stratton has been appointed manager.

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EXTENSIVE ALTERATIONS are now under way at the branch office 58 N. 12th Street. The office is under the supervision of branch manager Chas. Kofink.

BRANCH OFFICE "CD" 103 N. Front Street was recenty moved to 104 N. 2nd Street, to a more spacious and conspicuous location. All new equipment has been installed, the work being supervised by office electrican A. G. Carpenter. Harry Lewis has been appointed manager.

BURLINGTON, N. J., Postal office, has moved to its new quarters from the Elks Building to a new location opposite the P. R. R. station. The interior woodwork is of light oak and all new equipment including new standard type switchboard has been installed.

A NEW SET of Weiny-Phillips repeaters was recently installed at Reading, Pa., to handle the heavy volume of business in the Schuylkill Valley District.

SUPERINTENDENT C. E. BAGLEY has returned from a trip on the Lehigh, visiting Easton, Bethlehem and Allentown.

CHIEF OPERATOR E. W. MILLER, spent a day recently in Reading, Pa., on business.

"BOB MCCANDLESS, night service clerk, and recently returned from overseas duty, is enjoying a two-weeks vacation and is contemplating being a "benedict" upon his return to duty.

### Albany, N. Y., District.

MISS C. A. BROWN, succeeds Miss E. H. Hall, Whitehall, N. Y., as manager, Miss Hall having this week changed her name to Mrs. Sherlock.

HAROLD A. STRANG, for the past two years a Postal operator at Saratoga, N. Y., has been transferred to Utica and is now working the fast New York duplex.

THE ENTIRE FORCE of operators in the Albany main office operating room during the day period are returned soldiers.

### C. M. Holmes Appointed Manager at New Orleans.

C. M. Holmes, for many years manager of the Tampa, Fla., office of the Postal Telegraph Company has been advanced to the managership of the New Orleans, La., office. Mr. Holmes entered the service of the company at Jacksonville, Fla., in 1911, later being promoted to chief operator of the office, from which position he was transferred to Tampa as manager.

Mr. Holmes takes up the work at New Orleans at a time when the Postal Company's facilities, both telegraph and telephone, are being expanded.

Mr. Holmes succeeds N. E. Church, who retires from the service.

## RADIO TELEGRAPHY.

### Radio Corporation of America.

At a special meeting held November 20, the shareholders of the Marconi Wireless Telegraph Company of America voted in favor of the merger of the company with the Radio Corporation of America, effective December 1, from which date the Marconi Company ceased to be an operating company.

Edward J. Nally was elected president of the new company; Owen D. Young, chairman of the board of directors; Charles J. Ross, secretary; George S. DeSousa, treasurer; Hon. John W. Griggs, general counsel; Lewis MacConnach, assistant secretary; Marion H. Payne, assistant treasurer; and a strong board of directors.

The new company is exclusively American. Agreements have been made with the British Marconi Company and the Compagnie Generale de Telegraphie sans fil, by which the Radio Corporation will obtain enlarged facilities in Europe and in South America. Previously the American Marconi Company has been limited in its activities to the United States and Cuba.

Plans for the inauguration of a transoceanic wireless system are maturing which will place the company in position to furnish service equal to that of the ocean cables.

The General Electric Company is interested in the new corporation. The research laboratories and the engineering force of the General Electric Company have been at work for a number of years on radio matters; apparatus of great value was developed during the war. The Radio Corporation will take over all the radio patents and inventions of the General Electric Company and will also retain the highly specialized staff of the American Marconi Company.

CHARLES P. BRUCH, for many years vice-president of the Postal Telegraph-Cable Company, New York, has entered the service of the Radio Corporation of America, and has sailed for Buenos Aires, South America, in the interests of this company, and of the Pan American Wireless Telegraph Company. During the late war Mr. Bruch served as a major on the staff of the Chief Signal Officer, and later, during the period of government control of the telegraphs and telephones, was general manager of the Postal Telegraph Company, reporting to the Postmaster General.

W. H. MC COLLUM, formerly in charge of construction for the Postal Telegraph-Cable Company at New York, is now engaged in construction work for the Radio Corporation of America at its high-power stations at Cape Cod.

CAPTAIN POWHATAN PAGE, Argentine representative of the Pan American wireless Telegraph Company, who has been in New York several weeks, sailed for Buenos Aires, December 13.

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THE OFFICES of the New York depot of the Marconi International Marine Communication Company have been moved from the Woolworth Building to room 501, 198 Broadway.

MELVIN C. STEINER has been appointed purcasing agent, vice J. A. Sheridan, resigned.

A. C. HUBER has been appointed construction man in the division office, Gulf Division.

A. M. DOTY has been appointed resident inspector at Port Arthur, Texas, vice Charles H. Acree.

MISS VESTA WELCH, holder of a first grade radio operator's license, has been assigned as operator on the Steamship *Eastern States*. During the past season Miss Welch served as operator on the *Seeandbee,* being the first woman to act as radio operator on a vessel sailing on the Great Lakes.

IT IS REPORTED FROM WASHINGTON that the *Washington Herald,* recently purchased by Herbert Hoover and Charles R. Crane, will be managed by Walter Rogers and Herman Suter. Mr. Rogers, during the late war was in charge of the cable censorship in New York, later going to Paris where he had charge of the radio telegraph press service for the Committee on Public Information. Mr. Suter also was connected with the radio press service in Paris.

**Serial Building Loan and Savings Institution.**

A meeting of the shareholders of the Serial Building Loan and Savings Institution was held in the offices of the corporation at No. 195 Broadway, New York, on December 16. The purpose of the meeting was to nominate officers and directors for the coming year. The annual meeting of the shareholders will be held on January 20, 1920.

**Dishonest Telegraph Clerk Indicted.**

Arthur Nash, formerly night delivery clerk of the Muskogee, Okla., Western Union office, was indicted by the Federal Grand Jury on November 22, for having pocketed the tolls on telegrams which were destroyed after being transmitted.

IN the year 1888, the Canadian Pacific Railway Telegraphs had 5,210 miles of pole line, 17,826 miles of wire, and 575 offices in Canada.

THE KINETOSCOPE, Edison's first moving picture machine, was brought out in the year 1889.

COMMON BATTERY telephone systems were introduced in the year 1895.

THE STROWGER automatic telephone system was patented, March 10, 1891.

## THE CABLE.

PERCIVAL E. D. NAGLE has been appointed traffic manager of the Central and South American Telegraph Company, with offices at No. 89 Broad Street, New York. Mr. Nagle is a graduate of the class of 1906 of the United States Naval Academy, and has just returned to civil life after two and one-half years' active duty as lieutenant. During the war he was in charge of ocean cable traffic for the Navy Department, with headquarters at the cable censor's office, No. 20 Broad Street, New York.

**Western Union in the Pacific.**

While in San Francisco in the latter part of November, Newcomb Carlton, president of the Western Union Telegraph Company, gave out a statement in which he discussed his company's plans relative to an additional trans-Pacific submarine cable. Mr. Carlton said:

"What is needed on the Pacific Coast is a direct cable line between the United States from San Francisco via Seattle, to Japan. This cable we are planning to construct and negotations are in progress with certain Japanese capitalists who will participate financially in the construction and operation of the new system.

"The representatives of the company are now in London looking after the purchase of the cable. Every effort will be made to obtain its manufacture as quickly as possible. There is only one concern capable of making such a cable as we require. This company is in London and is crowded with work.

"Approximately $8,000,000 to $10,000,000 will be required to finance the proposed line. This includes the cost of the cable itself, the laying and the equipment of the various stations. The cable alone will cost about $2,000 a nautical mile.

5200 NAUTICAL MILES.

The route selected will be from San Francisco to Seattle, thence to the Aleutian Islands and from there to Japan, then either to Shanghai or Hongkong and overland to Peking. This distance is approximately 4200 nautical miles, as compared with the 7200 nautical miles of the Commercial Pacific Company, which only has a loop to Japan."

THOMAS D. LOCKWOOD, who retired recently from the position of general patent attorney of the American Telephone and Telegraph Company, on the evening of December 9, delivered an address before the Telephone Society of Boston, Mass., on the subject, "The Importance and Influence of Invention in The Bell System." Mr. Lockwood was in the service of the Bell Company continuously for forty years, and in the early days of the art was closely associated with Alexander Graham Bell, Thomas A. Watson, Theodore N. Vail, and J. J. Carty.

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## OBITUARY.

### Death of Harvey Lee Sellers.

Harvey Lee Sellers, sixty-three years of age, president of the Telepost Company, New York, died at the home of a cousin in Houston, Tex., on November 21. Two sons of Mr. Sellers, both first lieutenants in the United States Army, lost their lives in France during the late war. The cause of Mr. Sellers' death was heart trouble. He is survived by one daughter and one son. His home was in Montclair, N. J.

In the death of Mr. Sellers the Telepost Company loses a worker who had devoted the best part of his life to the subject of high speed automatic telegraphy. In the various attempts the company has made to inaugurate commercial service, using the chemical high speed system, Mr. Sellers was indefatigable in his efforts to make a success of the system.

MRS. BERTHA K. BRIEN, aged sixty-three years, wife of Mortimer A. Brien, died at Leavenworth, Wash., on November 15. Interment was at Helena, Mont., where four sons are buried. Mrs. Brien (then Bertha K. Phipps) entered the service of the Western Union Telegraph Company at New York, in the year 1875. 1878 she was married to M. A. Brien, a Western Union telegrapher, and in 1888 they went west and entered the service of the Northern Pacific Railroad at Helena, Mont. In 1901 they transferred their services to the Great Northern Railroad, where they have since been employed. Mrs. Brien is survived by four daughters, the eldest being the wife of J. G. Davies, superintendent of the Great North Western Telegraph Company at Winnipeg, Man.; also by three sons, two employed as operators on the Northern Pacific and one on the Great Northern Railroad at Spokane, Wash.

EDWIN DEAN, a well known telegrapher in Western Union service at No. 195 Broadway, New York, forty years ago, died on December 1, at his farm at Enfield, Conn.

JOSEPH A. PURCELL, old-time and military telegrapher, and who, beginning in the year 1865, was employed by the Western Union Telegraph Company at St. Louis, Mo., over a period of thirty years, died in that city December 3, as the result of an assault by foot-pads on November 13. Interment was in Calvary cemetery, St. Louis, on December 5.

IN A NUMBER OF TELEGRAPH OFFICES one member of the staff subscribes for TELEGRAPH AND TELEPHONE AGE—and pays for it. The rest of the folks read the journal regularly. Oh, well! our subscribers have lots of friends.

### Automatic Telephone Switching.

At the December 12 meeting of the American Institute of Electrical Engineers, New York, an important paper was presented by Arthur Bessey Smith, entitled," Applicability of Automatic Switching to All Kinds of Telephone Traffic."

Automatic telephony, although not a new subject in this country, has within the past two or three years made rapid strides. The large telephone companies have already made several automatic intsallations in large cities, and plans are under way to extend the use of automatic switching in localities where the volume of telephone traffic is very heavy.

### Telephone Pioneers of America.

A statement dated November 29, 1919, has been issued by Thomas D. Lockwood, chairman and vice-president, and R. H. Starrett, secretary, showing the Telephone Pioneers' Association to be in a satisfactory condition financially. Also, it is stated that the number of members continues to increase. On January 1, 1919, there were 1,385 members in good standing.

Hope is held out that before long it will be possible to resume the annual conventions which, from the organization of the association until 1916, proved to be largely attended and enjoyable occasions.

Theodore N. Vail is president, R. H. Starrett, secretary, and George D. Milne, treasurer of the association.

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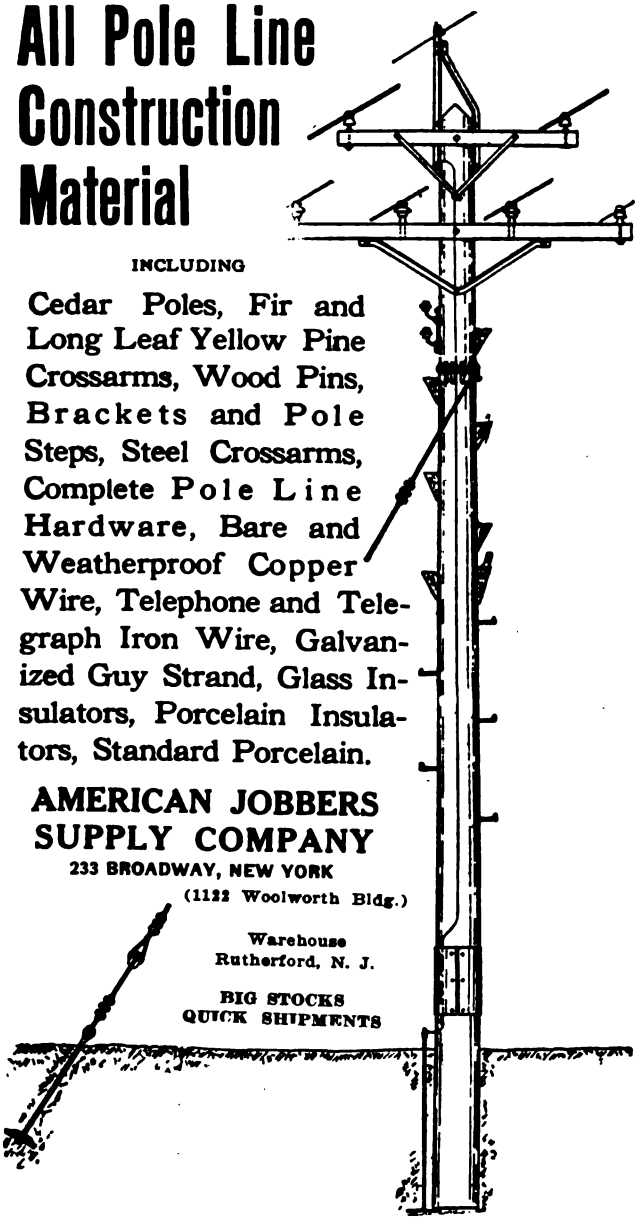

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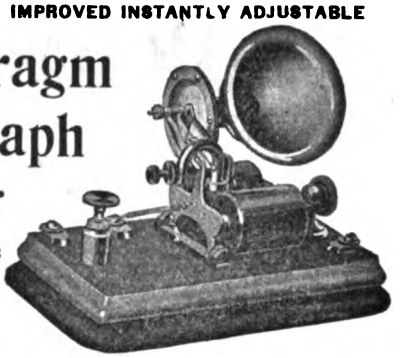

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### ASSOCIATIONS AND ORGANIZATIONS.

The Old Time Telegraphers' and Historical Association, Geo. D. Perry, Toronto, Ont., president; Thomas E. Fleming, 195 Broadway, New York, secretary and treasurer. All Old Time Telegraphers who are eligible for membership are requested to send for application blanks and become affiliated with this excellent association. The next reunion, Toronto, Ont., September, 1920.


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Time plants of every description from a single clock unit to a complete clock system can be obtained on outright purchase through the SELF WINDING CLOCK COMPANY, NEW YORK.

Time Signals of correction are furnished to either rental clocks or sold equipment from the Naval Observatory at Washington, D.C., and are transmitted hourly over the lines of the Western Union Telegraph Company.

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# Every Telegraph Operator

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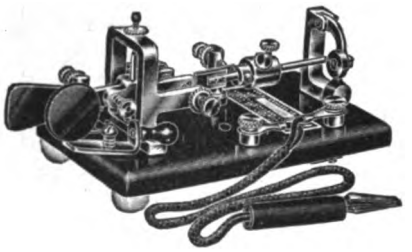

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Martin Vibroplexes and Mecograph Transmitters

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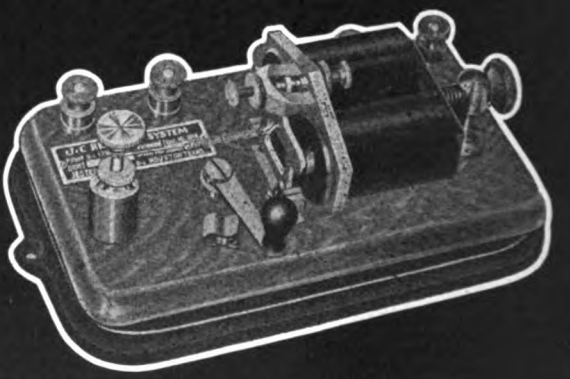

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EVERY day in business, new men are moving to the top. What sets these men apart for progress?

In what do they differ from their fellows? In natural ability? Yes. But chiefly in something else — in the training that gives them sure judgment and an unhesitating self-confidence.

In the panel on this page are the names of twenty great corporations, representing aggregate resources of billions of dollars.

How are the men being trained who, in five years, or ten years, or fifteen years are to head these great companies? How are the captains of industry of the next generation equipping themselves?

The answer is to be found in the numbers that follow the names of these twenty companies.

*Over 4100 men—the ablest, most promising younger men in these twenty leading companies are enrolled in the Alexander Hamilton Institute's Modern Business Course and Service.*

WITH all the resources of modern business at their command, these 4100 men have decided that this Course will fit them best for really big things.

Surely such a training, so magnificently endorsed, is worthy of your investigation at least.

***The Institution that trains men to be executives***

For ten years the Alexander Hamilton Institute has been entering one American business organization after another—always with the approval of the higher executives.

**Companies in which there are more than 100 subscribers for the Modern Business Course and Service.**

| | |
|---|---|
| Armour and Company | 141 |
| Bethlehem Steel Company | 159 |
| Burroughs Adding Machine Company | 180 |
| Commonwealth Edison Company of Chicago | 104 |
| E. I. DuPont de Nemours and Company | 204 |
| Ford Motor Company | 255 |
| General Electric Company | 605 |
| B. F. Goodrich Company | 132 |
| Goodyear Tire and Rubber Company | 295 |
| National Cash Register Co. | 196 |
| National City Bank of New York | 132 |
| New York Telephone Co. | 112 |
| Pennsylvania Railroad Company | 148 |
| Standard Oil Company of California | 165 |
| Texas Company | 126 |
| United States Steel Corporation | 450 |
| Western Electric Company | 168 |
| Western Union Telegraph Company | 193 |
| Westinghouse Electric and Manufacturing Company | 358 |
| Winchester Repeating Arms Company | 122 |

It is *the* Institution that has proved its power to train men for positions of executive responsibility. It offers only one Course; it has no specialized training to fit men for departmental positions of limited opportunity.

Its business is to take men who know only one department of business—whatever it may be, and to add a knowledge of organization, of sales, of merchandising, of credit, of corporation finance, of advertising, of accounting, of investment, of traffic and of costs.

It gives such men the knowledge of all departments that will fit them to direct the work of other men.

***Advisory Council***

The Advisory Council of the Institute consists of:

Frank A. Vanderlip, the financier; General Coleman duPont, the well-known business executive; John Hays Hammond, the eminent engineer; Jeremiah W. Jenks, the statistician and economist; and Joseph French Johnson, Dean of the New York University School of Commerce.

This advertisement is addressed to two types of men. First to the chief executives of corporations, large or small. In such men's minds the question arises every day: "What can I do to be sure that my company will make steady progress thru the next ten years?"

***Are you content to stand still while your competitors outstrip you?***

HERE is one thing you can do today. You can investigate an Institution that has proved its power to increase the chief asset of the twenty great corporations listed on this page.

You can help your men grow; and their growth will automatically take care of yours.

And the advertisement is addressed also to every man who is looking toward the future; to every man who is asking himself, "Where am I going to be ten years from now?"

If *you* are such a man; if you want the next ten years to bring you satisfaction instead of regret, a moment's decision now may change the whole record of your future.

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THE Alexander Hamilton Institute courts the fullest investigation. Some of the 110,000 men who have benefited by its training are in your very neighborhood; ask them.

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It is a book full of valuable information; it tells what the Institute has done for other men, and other companies—it is sent without obligation. Send for your copy now.

**ALEXANDER HAMILTON INSTITUTE**
241 Astor Place, New York City

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**FIRE ALARM AND POLICE TELEGRAPHS**

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It has been especially designed for the accurate testing necessary in telephone service. It has the exceptionally high internal resistance which is essential.

The Wire Chief's Instrument, through a series of tests for which it is specially devised, affords an incomparable means of determining rapidly the condition of subscribers' lines.

As efficient service is the primary consideration in the administration of an exchange, a degree of accuracy and reliability is required which only a Weston Instrument can offer. Complete information concerning this and other Weston Models will be sent on request.

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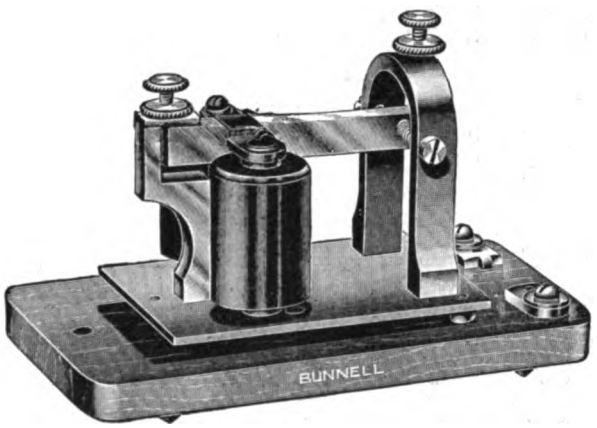


The advantage of the low resistance type is that the ordinary wiring may be used between the instruments and the secondary of transformer, but where loud, strong action is desirable, the high resistance type with condenser is preferable. Current consumption is only about forty milliamperes in either type. The new Ghegan **A C Relay** is another **practical device.** Works perfectly on fifteen milliamperes of current.

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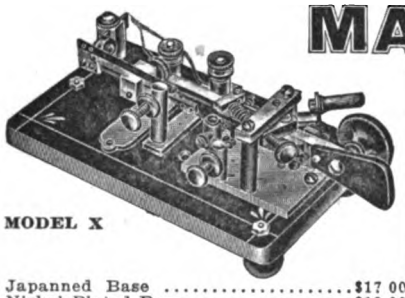

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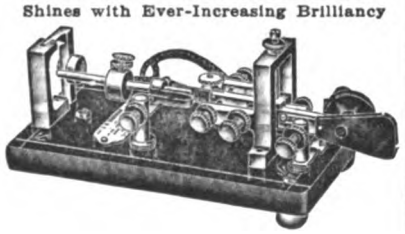

GENUINE VIBROPLEX
OLD STYLE SINGLE LEVER
Japanned Base, $17.
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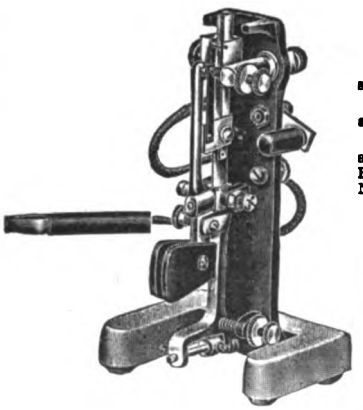
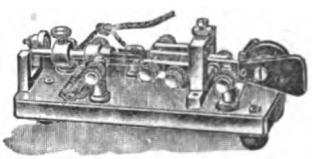
THE NEW MARTIN VERTICAL VIBROPLEX, PRICE $17.00



Easy to learn, easy to operate. Gives the operator wonderful control over his machine. Price, $17.

A NEW MODEL VIBROPLEX NUMBER 4.



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Left-handed machines, $1 extra

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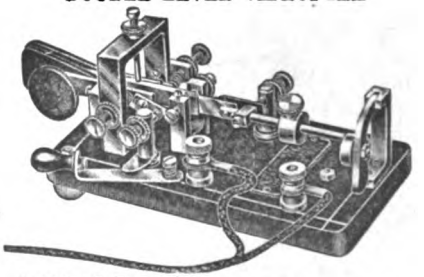

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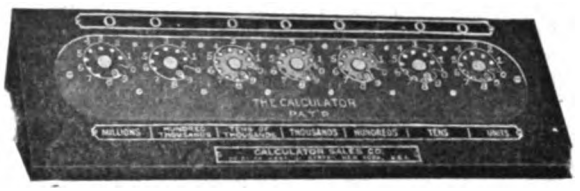

I AM IN TROUBLE, remarked the receiving clerk to the delivery clerk. I have added this column of figures several times and every time I have a different result This is a universal complaint. Why worry over figures. Let the Calculator Adding Machine do the work for you.

This adding machine is particularly adapted to the telegraph service.

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# Telegraph and Telephone Age

253 BROADWAY
NEW YORK

J. B. TALTAVALL
Publisher

DONALD McNICOL, Editor
ESTABLISHED 1883
Issued on the 1st and 16th of each month
Price, $2.00 Per Year
$1.00 for six months.


TELEGRAPH AND TELEPHONE AGE is the only publication in this country devoted exclusively to the interests of the telegraphs, the telephones, wireless telegraphs and submarine cables. In the pages of this magazine are recorded the activities of the different societies, associations, clubs, etc., both social and official, connected with the various companies.

Our correspondents and agents all over the United States and Canada and throughout the world secure for us the facts of all the important events connected with these industries, so that we are enabled to present them to our readers in a clear and concise manner.

The value of the magazine does not end here, however. We have special articles for the thinker; those who wish to advance themselves in their respective lines of employment.

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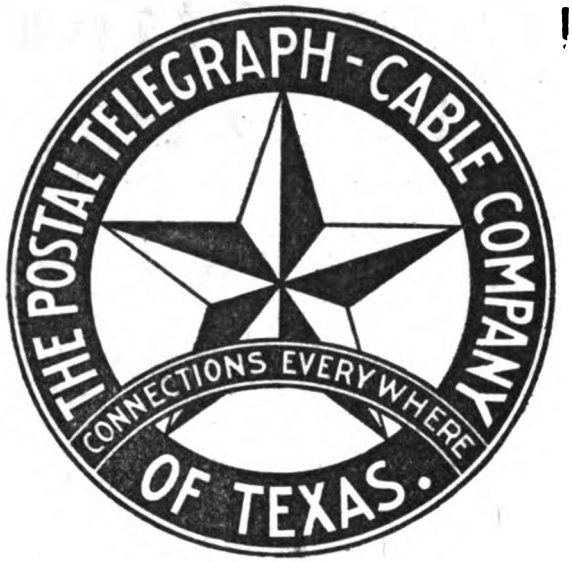


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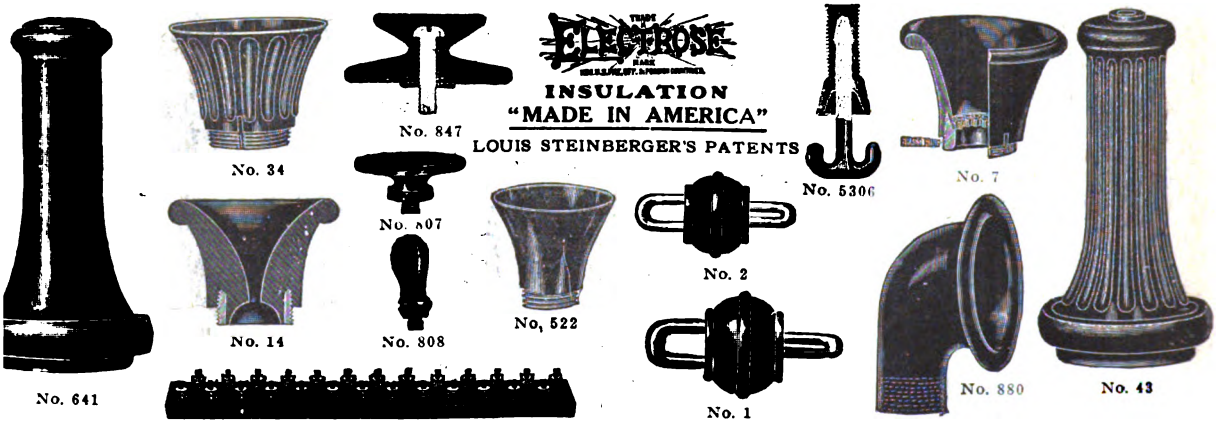


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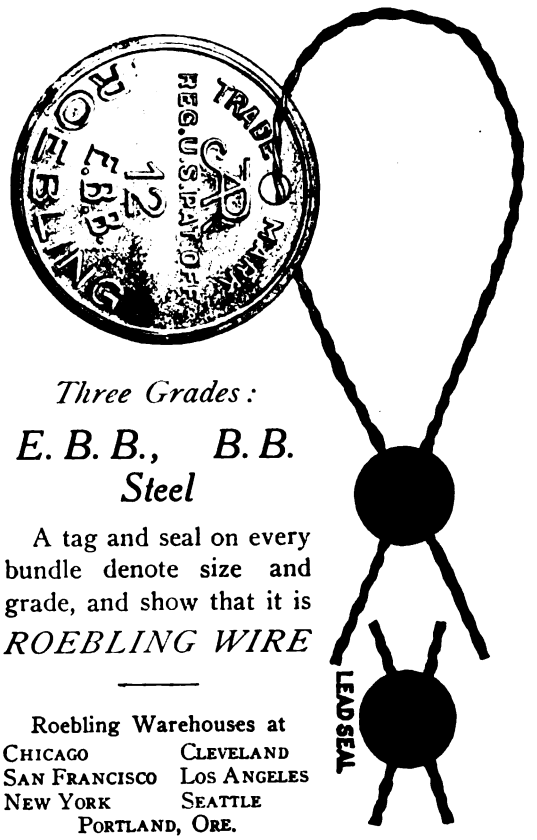


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